LET US UNDERSTAND MATHEMATICS

CLASS 5

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PREFACE

This is part of a series of books based on research on teaching of mathematics for class 5. The focus here is on laying a foundation for further learning of mathematics and understanding of concepts and procedures. Accordingly concepts are presented by manipulatives, pictures, real world situations, spoken and written words and symbols and opportunities are provided for translation from one mode to another. Ample opportunities are provided for applications of mathematics to real world situations, reasoning, communication and problem solving. The schools that can should provide ample quantities of materials such as geometrical models, tangram pieces, blocks, geoboards, dot papers, balances, fraction pieces, graphs, scissors, and ropes. The others can make many of these. Some activity sheets are provided that can be removed and used.

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UNIT 1

Numbers

Review of Numbers

Hindu Arabic numeration system is based on ten. In this system any number however large can be written using digits 0-9 by using the concept of place value and zero as a placeholder. The numbers increase by one, after 9 instead of adding a new symbol for the next number; we add a place to its right and give it a name ten's place. All two-digit numbers up to 99 can be written using these places. We add another place for the next number hundred. All numbers from 100 to 999 can be written using these three places. We can continue in this manner adding a place to the left of the existing places and giving it a name for extending the numbers system to as many places as we like.

Any place always has a place value ten times the place value of the place to its right.

We have learnt to write six-digit numbers. The first six places are given in first row or column headings in the table given below:

Number	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones
6						6
59					5	9
563				5	6	3
4,708			4	7	0	8
92,390		9	2	3	9	0
73,006		7	3	0	0	6
3,06,256	3	0	6	2	5	6
1,00,453	1	0	0	4	5	3

Read the numbers given in the above table.
Write them in words.
Write them in expanded form.

Exercise1.1

1. Read the following numbers:
   467; 703; 1,274; 1,000, 14,667; 1706; 21,089, 4,005, 20,053, and 1,42,735.
2. Make a place value chart and write the numbers in the chart (to be dictated by the teacher).
   (a) 3,765 (b) 3,089 (c) 4,008
   (d) 24,578 (e) 40,765 (f) 2,63,741
   (g) 44,067 (h) 3,60,002 (i) 2,30,030
3. Write the following numbers in figures:
   (a) Six thousand
   (b) Eight thousand three hundred sixty four
   (c) Forty three thousand seven hundred fifty seven
   (d) Nine thousand nine
   (e) Two lakh seventy five thousand four hundred sixty two
   (f) Two thousand four hundred six
   (g) Two lakh eighty thousand six
   (h) Seven thousand eighty five
   (i) Twenty four thousand one
   (j) One thousand seven hundred eight
4. Write the following numbers in words:
   (a) 3,867 (b) 1803 (c) 4002 (d) 12,894 (e) 29,004
   (f) 1,26,009 (g) 8,056 (h) 41,090 (i) 27,052 (j) 1,74,005
5. What comes just after the following numbers?
   (a) 1,019 (b) 26,734 (c) 9999 (d) 99,999 (e) 1,999
6. What comes just before the following numbers?
   (a) 500 (b) 4,680 (c) 12,000 (d) 23,260 (e) 2,74,700
7. Write the numbers whose expanded forms are given below:
   (a) 4 thousands + 3 hundreds + 2 tens + 7 ones
   (b) 2 ten thousands +8 thousands + 7 hundreds + 0 tens + 5 ones
   (c) 4 ten thousands +3 thousands + 0 hundreds + 4 tens + 0 ones
   (d) 1 ten thousand + 9 thousands + 5 hundreds + 0 tens + 6 ones
   (e) 2 thousands + 6 hundreds + 9 tens + 0 ones
8. Write the expanded forms of the numbers given below:
   (a) 6,952 (b) 18,478 (c) 25,089 (d) 6,030 (e) 14,002
9. Name the digit in specified place for the following numbers:
   (a) One’s place for the number 1,980
   (b) Thousand’s 6,871

(c) Hundred’s place for the number 58,453

(d) Ten’s place for the number 1,25,672

10. Write the place value of the coloured digit in the following numbers:

(a) 6,387 (b) 18,654 (c) 2,483 (d) 17,469 (e) 28,462

(f) 5,804 (g) 1,964 (h) 4,826 (i) 30,659 (j) 780

11. Write three numbers that lie between

(a) 40 and 50

(b) 560 and 570

(c) 6,270 and 6,280

(d) 100 and 200

(e) 6,780 and 6,790

(f) 5,700 and 5,800

(g) 3,000 and 4,000

(h) 58,000 and 59,000

(i) 4,72,000 and 4,73,000

12. Find examples of use of large numbers in our daily lives and present them in class.

Comparison of numbers

You may recall that the digits in different places have different values. The first digit on the right is in one’s place has the value 1 and its value is the same as the digit. The digit on its left is in ten’s place has the value 10 and we count as many tens as the digit to find its value. The digit to the digit on left of ten’s place is in hundred’s place has the value 100 and we count as many hundreds as the digit to find its value. The number is equal to the sum of all these values. We can compare numbers by either remembering the number that came earlier in counting is less than the number that came later in counting or by looking at the digits.

If the number of digits is different in the two numbers, the number with larger number of digits is greater than the one that has fewer digits, for example, 45 > 8, 674 > 89, 5234 > 687, 25,781 > 8,629, 1,67,903 > 98,528.

If the two numbers have the same number of digits, we first look at the digit in the place with highest place value in the two numbers, if these are different than the number in which this digit is larger is greater than the number in which digit in that place is smaller, for example 456 > 278 or 278 < 456, 7835 > 6835 or 6835 < 7835, 56,982 > 40,789 or 40789 < 56,982, 4,56,891 > 2,89,461 or 2,89,461 < 4,56,891.

If the digits in this place are the same in both the numbers, then we compare the digits in the next place. If these are different the number in which digit in this place is larger is greater than the number in which digit in this place is smaller, for example, 247 > 228 or 228 < 247, 7478 > 7259 or 7259 < 7478, 45,789 > 42,986 or 42,986 < 45,789.

If the digit in the leftmost place as well as the place adjacent to it are the same the same in both the numbers, then we compare the digits in the next place. If these are different the number in which digit in that place is larger is greater than the number in which digit in that place is smaller, for example, 783 > 782 or 782 < 783, 9437 > 9419 or 9419 < 9437, 56,984 > 56,789 or 56,789 <56,984. We continue examining in this manner the next digits if more than two left most digits are the same in four to six digit numbers till one’s place. If the digits in all places are the same in both the numbers, then the two numbers are equal, for example, 658 = 658, 7,495 = 7,495, 23,467 = 23,467.

Exercise 1.2

1. Compare the following numbers by writing >, <, or = between numbers:
   (a) 678 _____ 89
   (b) 2,457 _____793
   (c) 4,569 _____4,584
   (d) 78,952 _____63,763
   (e) 48,649 _____48,798
2. Arrange the following numbers from smallest to largest:
   (a) 25, 67 and 30
   (b) 462, 8,73 and 760
   (c) 546, 8,531 and 4,906
   (d) 4,785; 4,794 and 34,762
3. Arrange the following numbers from largest to smallest:
   (a) 58, 78 and 23
   (b) 567, 349 and 782
   (c) 9,432; 25,873 and 5,982
   (d) 67,413; 85,329 and 85,964
4. Write the smallest four-digit number
5. Write the largest five-digit number
6. Write the smallest number using digits 3, 9 and 2. Use each digit once only.
7. Write the largest number using digits 4, 8, 5 and 2. Use each digit once only.
8. Write all the numbers using digits 3 and 5. Use each digit once only.
9. Write all the numbers using digits 4, 2 and 9. Use each digit once only.
10. Write all the numbers using digits 5, 1 and 0. Use each digit once only.

Number line

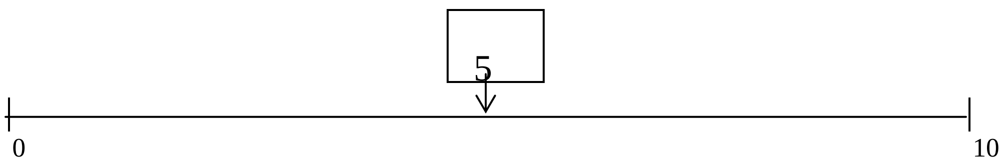
A number line is a line in which numbers are marked in order at equal distances beginning with zero.

Estimation of numbers on number line

Estimation of numbers on number line enhances understanding of number values and rounding numbers. Marking an arrow midway will be helpful.

Examples

Estimate the number to which each arrow points to and write it in the box:
The arrow is about midway between 0 and 10, therefore its estimate is 5.



The arrow is a little less than midway between 0 and 5; therefore its estimate is 2.

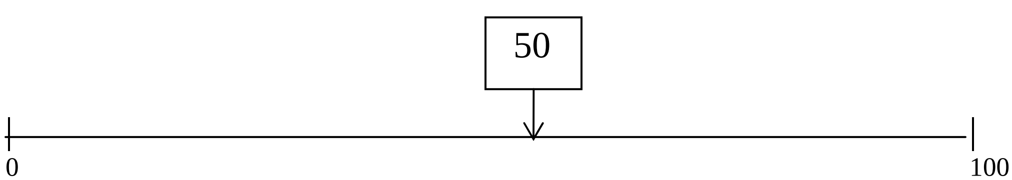
The arrow is quite close to 10; therefore its estimate is 9.

Estimation on 0-100 lines

The lines given below are on a different scale, the same distance on these points to a position ten times that 0-10 line.

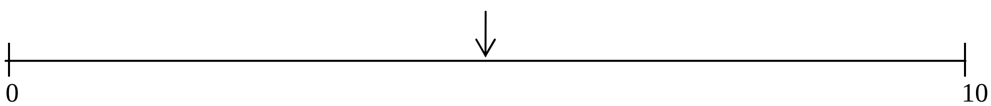
Examples

The arrow is midway between 0 and 100; therefore, its estimate is 50.

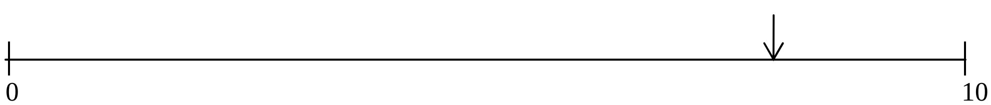


The arrow is a little more than midway between 0 and 50; therefore its estimate is 30.

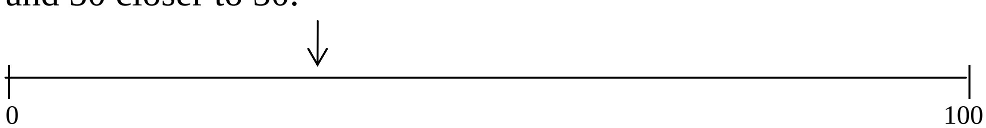
Estimating positions of numbers on number lines
We can similarly point approximately to position on number lines.
Examples:
Estimate, 5 on the number line given below and draw an arrow there
5 will be midway between 0 and 10, so we draw an arrow there.



Estimate, 8 on the number line given below and draw an arrow there
It will be helpful to think of a number midway to locate other points. Number 8 is closer to 10 than 5, so we draw an arrow between 5 midway and 10 closer to 10.

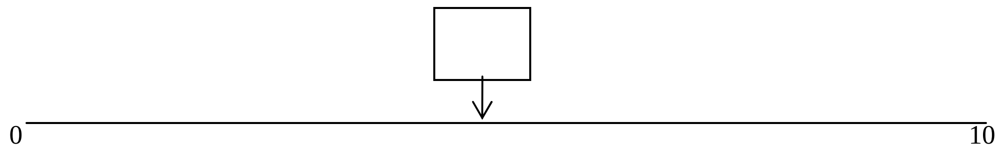


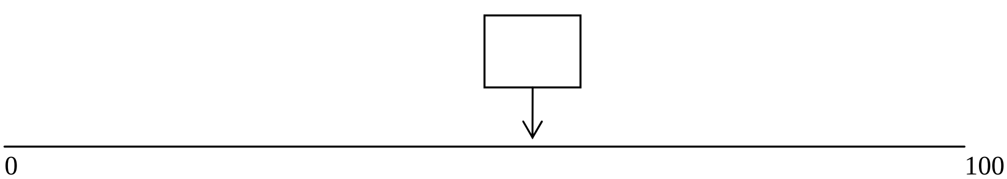
Estimate, 35 on the number line given below and draw an arrow there
It will be helpful to think of a number midway in this case 50 to locate other points. Number 35 is closer to 50 than 0, so we draw an arrow between 0 and 50 closer to 50.



Exercise 1.3

Estimate the number to which each arrow points to and write it in the box:





Estimate the positions of following numbers on the number lines and draw an arrow there.

5

0 10

9

0 10

50

0 100

80

0 100

42

0 100

77

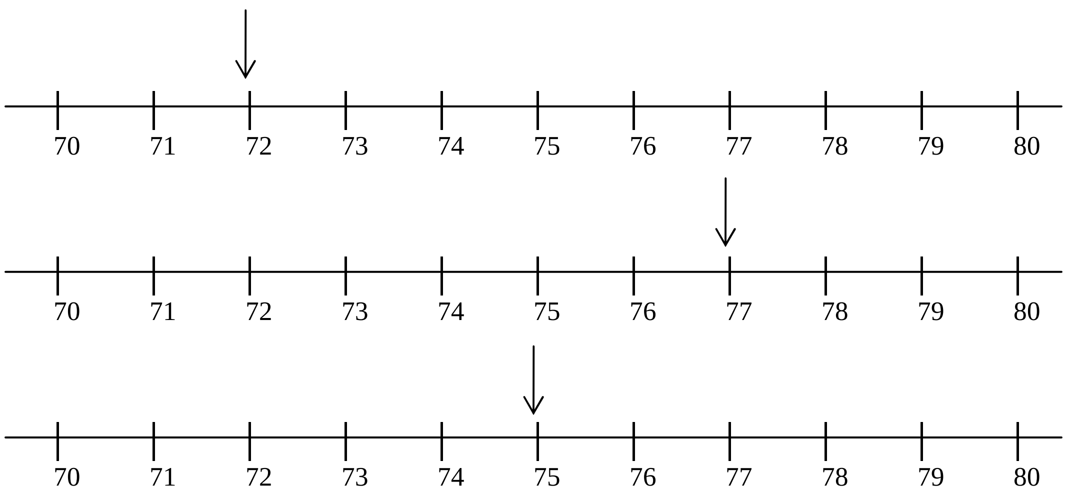
0 100

Rounding Numbers

We often need to round numbers as measures of those may not be available e.g. coins, approximate results would do e.g. population of a village or city, to check reasonableness of results quickly while doing computations by using a calculator or computer or paying bills. We will restrict to rounding to the nearest 10, 100 and 1000 only.

Rounding to nearest 10

We look at the multiples of 10 between which the number lies and round it to the multiple of ten to which it is nearer e.g. 72, lies between 70 and 80. As it is nearer to 70 than 80, so we round it off as 70. Similarly, 77 also lies between 70 and 80. However, it is nearer to 80 than 70 so we round it off as 80. If a number lies midway between two numbers, we round it up to the larger number. For example 75 lies midway between 70 and 80, we round it off as 80. We can also draw a number line from 70 to 80 that would make it more vivid.



We can similarly round numbers with more digits to the nearest ten.
Example-Round 537 to the nearest ten.
537 lies between 530 and 540, it is nearer to 540 than 530. Therefore, we round it to 540.

Rounding to nearest 100

We look at multiples of 100 between which the number lies and round it off to the hundred to which it is nearer e.g. 472, lies between 400 and 500. As it is nearer to 500 than 400 so we round it off as 500. Similarly 834 lies between 800 and 900, it is nearer to 800 than 900 so we round it off as 800. If a number lies midway between two numbers, we round it up to the larger

number. For example 250 lies midway between 200 and 300, we round it as 300.
We can similarly round numbers with more digits to the nearest hundred
Example 1- Round 5,320 to the nearest hundred.
5,380 lies between 5,300 and 5,400, as it is nearer to 5,300, we round it as 5,300
Example 2- Round 56,789 to the nearest hundred.
56,789 lies between 56,700 and 56,800, as it is nearer to 56,800, we round it as 56,800.
Rounding to nearest 1000 We look at multiples of 1000 between which the number lies and round it off to the thousand to which it is nearer e.g. 2,258, lies between 2,000 and 3,000. As it is nearer to 2,000 than 3,000 so we round it as 2,000. Similarly 7864 lies between 7,000 and 8,000, it is nearer to 8,000 than 7,000 so we round it off as 8,000. If a number lies midway between two numbers, we round it up to the larger number. For example 5,500 lies midway between 5,000 and 6,000, we round it up as 6,000.
We can similarly round numbers with more digits to the nearest thousand e.g. round 3,47,820 to the nearest thousand.
3,47,820 lies between 3,47,000 and 3,48,000, as it is nearer to 3,48,000, we round it as 3,48,000.

Exercise 1.4

1. Write the next numbers of the series given below:
   (a) 50, 60, 70, ______
   (b) 300, 400, 500, ______
   (c) 6,000; 7,000; 8,000; ______
   (d) 67,000; 68000; 69,000; ________
   (e) 43, 53, 63, 73, _______
   (f) 7,456; 7,556; 7,656; 7,756; ________
2. Write the tens between which the following numbers lie:
   (a) 34 lies between 30 and 40
   (b) 67 lies between.____ and ______
   (c) 167 lies between ________and ________
   (d) 2375 lies between ________and ________
3. Write the hundreds between which the following numbers lie:
   (a) 560 lies between 500 and 600
   (b) 1,682 lies between ________and ________
   (c) 11,723 lies between ________and ________
   (d) 86,550 lies between ________and ________
4. Write the thousands between which the following numbers lie:
   (a) 5,892 lies between 5000 and 6000
   (b) 7,351 lies between ________and ________
   (c) 4,23,405 lies between ________and ________
5. Encircle the correct number
   (a) 61 is nearer to 60 or 70.
   (b) 217 is nearer to 200 or 300.
   (c) 2,566 is nearer to 2,000 or 3,000.
   (d) 24,330 is nearer to 24,000 or 25,000.
6. Round the numbers given below to the nearest ten:
   (a) 62 (b) 145 (c) 1,275
7. Round the numbers given below to the nearest hundred:
   (a) 234 (b) 1450 (c) 2,677 (d) 56,235
8. Round the numbers given below to the nearest thousand:
   (a) 5,200 (b) 1,783 (c) 5,500 (d) 38,678

UNIT 2

Operation on Numbers

Multiplication

By now, you should be able to answer without thinking the multiplication facts. Do the mastery test on multiplication given in Appendix 3.If you cannot recall some multiplication facts without starting the table from 1 or other aids, memorise them. In 6 × 8 = 48, 6 and 8 are called **factors** of 48. We also call 6, the **multiplicand** and 8 the **multiplier**. The number 48 obtained by multiplication is called the **product**.

Multiplication of a three-digit number by a three-digit number

Multiplication of a number by a three-digit number can be done by following the steps given below:

1. Multiply the number by ones
2. Multiply the number by tens
3. Multiply the number by hundreds
4. Add them.

Examples

```
      1
    2 5
    1 4
    538
  × 275
  --------
   2690        538 × 5
  37660        538 × 70
 107600        538 × 200
-----------
 147950        2690 + 37660 + 107600
-----------
```

```
     24
     12
    726
  × 840
-----------
  29040        726 × 40
 580800        726 × 800
-----------
 609840        29040 + 580800
```

```
   31
   62
   694
 × 407
 --------
   4858        694 × 7
 277600        694× 400
-----------
 282458        4858 + 277600
-----------
```

Estimation of products

As the numbers get large, it becomes tedious to multiply by paper and pencil and one may use a calculator. However, one can make mistakes with the calculator also. We can find an estimate by rounding off the two-digit numbers to nearest ten, three-digit numbers to nearest hundred and multiplying these mentally. This would help us to find out whether the product given by calculator is reasonable or not.

Examples

Find an estimate of the product of 213 × 48

Rounding off 213 to nearest 100 and 48 to nearest 10, we get 200 and 50 and multiplying them the estimate of the product is 10,000. Whereas 213 × 48 = 10,224 close to it.

Find an estimate of the product of 680 × 523

Rounding off 680 and 523 to nearest 100, we get 700 and 500 and multiplying them the estimate of the product is 3,50,000. Whereas 680 × 523 = 3,55,640 close to it.

Multiplication of three numbers

There are some situations where we need to multiply three numbers. For example, a carton can hold 10 egg trays each of which contains 12 eggs, and we want to know how many eggs will 6 cartons contain?

Here we first find how many eggs would one carton contain and then how many eggs would six cartons contain as follows:

1 carton will contain 12 × 10 = 120 eggs

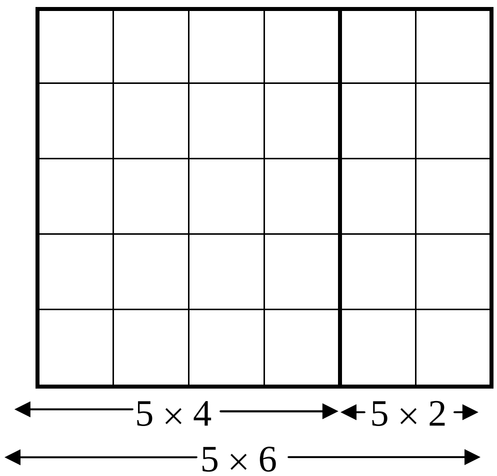
6 cartons will contain 120 × 6 = 720 eggs

Properties of multiplication

- The order of numbers in a multiplication does not matter, e.g. 3 × 4 = 4 × 3 =12.
- We can multiply three numbers by first multiplying any two of them and then multiplying their product with the third number, e.g. 3 × 5 × 2 = 15 × 2 = 3 × 10

= 6 × 5 = 30

- As the grid given below shows the product of a number and sum of two numbers is the same as sum of the products of the number with the individual numbers e.g. 5 × 6 = 5 × (4 +2) = 5 × 4 + 5 × 2.



Exercise 2.1

1. Fill in the blanks
   (a) $7 \times 4 = 4 \times$ ___
   (b) $5 \times$ ___$= 6 \times 5$
   (c) $6 \times 8 \times 2 = 48 \times$___
   (d) $4 \times 7 \times 3 = 4 \times$ ___
   (e) $2 \times 6 \times 5 = 10 \times$ ___
   (f) $8 \times (5 + 4) = 8 \times 5 + 8 \times$ ___
   (g) $9 \times 8 = 9 \times (2 +$___)
   (h) $6 \times (2 + 5) = 6 \times (3 +$ ___)
2. Observe the pattern in writing these numbers are and write the next two terms:
   (a) 7, 14, 21, 28, ___, _____.
   (b) 1, 2, 4, 8, ___, _____.
   (c) 1, 4, 9, 16, ___, _____.
3. Find the following products
   (a) 378×10 (b) 482×40 (c) 361×700 (d) 653×400
4. Multiply the following using the short algorithm:
   (a) 4267×7 (b) 6703×5 (c) 5009×6 (d) 49×34
   (e) 46×80 (f) 93×64 (g) 40×63 (h) 539×26
   (i) 906×82 (j) 365×842 (k) 706×257 (l) 583×207
5. Read the numbers given below:
   (a) 600 (b) 3,200 (c) 28,000
   (d) 54,000 (e) 1,50,000 (f) 3,20,000
6. Multiply the following mentally
   (a) 30×40 (b) 50×80 c) 60×90
   (d) 200×30 (e) 400×60 (f) 700×70
   (g) 600×200 (h) 500×300 (i) 400×800
7. Multiply the following and estimate the following products to check if your answer seems reasonable.
   (a) 48×63 (b) 52×84 c) 37×23
   (d) 168×23 (e) 842×48 (f) 670×32
   (g) 493×325 (h) 875×437 (i) 782×514
8. Give situations in daily life that call for multiplication

Division

By now, you should be able to answer without thinking the division facts. Do the mastery test on division given in Appendix 4.If you cannot recall some division facts without using some aids note those down and memorise them.

Division of a number by a one-digit number

To divide a number by a one-digit number,

1. We first look at the digit with highest place value say thousands. If the number of thousands is greater than the divisor, find highest multiple of the divisor less than the number of thousands. The number that multiplied by the divisor gives the highest multiple is the number of thousands in the quotient and we write it in thousand's place in the quotient. We write the product below thousands in the dividend, subtract it from that and write the difference below that after drawing a line. We rename these thousand as hundreds and combine it with hundreds in the dividend by writing the hundreds to the right of thousands to indicate the number of hundreds we have.
   If the number of thousands is less than the divisor, we rename thousands as hundreds combine it with hundreds in the dividend by writing hundreds to the right of that to indicate the number of hundreds we have.
2. Look at hundreds, find highest multiple of the divisor less than the number of hundreds and write it in hundred's place in the quotient. We write the highest multiple below hundreds in the dividend, subtract it from that, and combine it with tens in the dividend by writing tens to the right of that to indicate the number of tens we have.
   If the number of hundreds is less than the divisor, we write zero in hundred's place in the quotient. We rename hundreds as tens combine it with tens in the dividend to indicate the number of tens we have.
3. If the number of tens is more than the divisor, we find the highest multiple of the divisor with tens less than the number of tens. The number that multiplied by the divisor gives the highest multiple is the number of tens in the quotient and we write it in ten's place in the quotient. We write the product below the tens, subtract it from that and write the difference below that after drawing a line. We rename the difference as ones and combine it with ones in the dividend by writing the ones to the right of tens to indicate the number of ones we have.
   If the number of tens is less than the divisor, we write zero in ten's place in the quotient. We rename tens as ones combine it with ones in the dividend to indicate the number of ones we have.
4. Find highest multiple of the divisor less than the number of ones. The number that multiplied by the divisor gives the highest multiple is the number of ones in the quotient we write it in one's place in the quotient.
   If the number of ones is less than the divisor, we write zero in one's place in the quotient.
5. Subtract the product of the ones in the quotient and divisor from the ones to find the remainder.

Example 11

$$\begin{array}{r} 142 \\ 6\overline{)853} \\ \underline{6} \\ 25 \\ \underline{24} \\ 13 \\ \underline{12} \\ 1 \end{array}$$

Verification of the answer

  142
× 6

  852
+ 1

  853

Example 12

$$\begin{array}{r} 205 \\ 3\overline{)617} \\ \underline{6} \\ 01 \\ \underline{0} \\ 17 \\ \underline{15} \\ 2 \end{array}$$

Verification of the answer

  205
× 3

  615
+ 2

  617

Examples 13

$$
\begin{array}{r}
1643 \\
4\overline{)6572} \\
\underline{4} \\
25 \\
\underline{24} \\
17 \\
\underline{16} \\
12 \\
\underline{12} \\
0
\end{array}
$$

Verification of the answer

1643
× 4

6572

Example 14

$$
\begin{array}{r}
373 \\
7\overline{)2613} \\
\underline{21} \\
51 \\
\underline{49} \\
23 \\
\underline{21} \\
2
\end{array}
$$

Verification of the answer

373
× 7

2611
+ 2

2613

If the number with the highest place value is less than the divisor, remember to start writing the quotient in the next place.
If the number of the hundreds, tens or ones after renaming is less than the divisor, remember to write 0 in their place in the quotient.

Division of a number by a two-digit number

It is similar to dividing a four-digit number by a one-digit number except that we cannot use division facts and it would be very time consuming to find the greatest multiples less than the number of hundreds, tens and ones to find the quotients in hundred's, tens and one's place.

We can do it informally by repeated subtraction of convenient multiples of the divisor till the remainder is less than the divisor. The quotient is the sum of all the multiples.

Examples

$$
\begin{array}{rl}
23\overline{)96} & \\
23 & 23 \times 1 \\
\hline
73 & \\
23 & 23 \times 1 \\
\hline
50 & \\
23 & 23 \times 1 \\
\hline
27 & \\
23 & 23 \times 1 \\
\hline
4 &
\end{array}
$$

As 4 < 23 4 is the Remainder and Quotient = Sum of all the multiples = 1 + 1 + 1 + 1 = 4.

We can verify if the division is correct by checking if

Quotient × Divisor + Remainder = Dividend.

Verification- 23 × 4 = 92 + 4 = 96

$$
\begin{array}{rl}
28\overline{)643} & \\
280 & 28 \times 10 \\
\hline
363 & \\
280 & 28 \times 10 \\
\hline
83 & \\
28 & 28 \times 1 \\
\hline
55 & \\
28 & 28 \times 1 \\
\hline
27 &
\end{array}
$$

Remainder =27
Quotient = 10 + 10 + 1 + 1 = 22
Verification of the answer 28 × 22 + 27 = 616 + 27 = 643 same as dividend

Short algorithm

We can also find the digits in different place in the quotient by following a step-by-step procedure given below.

Two-digit dividend

1. Round off the dividend and the divisor to the nearest tens.
2. We can now divide these using multiplication facts to estimate the digit in one's place. For example, to divide 64 by 21, we round off these to 6 tens and 2 tens, this gives the estimate of the digit in one's place as 3.
3. We next multiply the estimate by the divisor and check if the product of the divisor and estimate is less than the dividend then subtract the product from the dividend.

   If the product of the divisor and estimate is greater than the dividend, revise the estimate downward and check again.

   In our example as 21 × 3 = 63 < 64, we subtract the product from the dividend to find the difference.
4. If the difference is less than the divisor, then the difference gives the remainder. If the difference is greater than the divisor, then we need to revise the estimate upwards.

   As 64 – 63 = 1 < 21. Therefore, 3 is the correct quotient and 1 is the remainder.

Three-digit dividend

1. We first look at hundreds and round off the dividend to the nearest hundred and the divisor to nearest ten.
2. We can now divide these using multiplication facts to estimate the digit in ten's place. For example, to divide 464 by 28, we round off 464 to 5 hundreds and 28 to 3 tens and divide these, this gives the estimate of the digit in ten's place as 1.
3. We next multiply the estimate by the divisor and check if the product of the divisor and estimate is less than the dividend. In this example 28 × 1 = 28, 28 × 2 = 56 > 46.
4. Subtract the product of 28 × 1ten= 28 tens from the tens in the dividend. That gives 46- 28= 18.tens, rename these as 180 ones and combine these with 4 ones from the dividend by writing 4 to the right of 18 to get 184.
5. Estimate the digit in one's place by rounding off 184 to the nearest ten that is 18 tens and divide it by the 3 tens to estimate of the digit in one's place as 6.
6. We next multiply the estimate by the divisor and check if the product of the divisor and estimate is less than the difference.

   If the difference is greater than the divisor, then we need to revise the estimate

upwards.
In our example $28 \times 6 = 164 < 184$.

7. Subtract the product from the dividend to get the remainder $184 - 164 = 20$.

$$
\begin{array}{r}
16 \\
28\overline{)464} \\
\underline{28} \\
184 \\
\underline{164} \\
20
\end{array}
$$

Exercise 2.2

1. In

$$\begin{array}{r} 9 \\ 8\overline{)74} \\ 72 \\ \hline 2 \\ \hline \end{array}$$

   What is the
   (a) the dividend -
   (b) the divisor -
   (c) the remainder -
   (d) Verify the answer.
2. Fill in the blanks:
   (a) 23 ÷ ___= 1
   (b) 0 ÷ 34 = ___
   (c) 175 ÷ ____= 175
3. Observe the pattern in writing these numbers are and write the next two terms
   (a) 32, 16, 8, 4, ____, ____.
   (b) 1,00,000: 10,000; 1,000; 100; ____; ____.
4. Estimate the following to nearest ten:
   (a) 72 (b) 87 (c) 248 (d) 163
5. Estimate the following to nearest hundred:
   (a) 473 (b)380 (c) ,1479 (d) 1821
6. Divide the following and verify your answer:
   (a) $7\overline{)452}$ (b) $8\overline{)823}$ (c). $9\overline{)909}$ (d) $3\overline{)4573}$
   (e) $5\overline{)6553}$ (f) $9\overline{)6752}$ (g) $8\overline{)8413}$ (h) $6\overline{)1821}$
7. Divide the following and verify your answer:
   (a) $23\overline{)94}$ (b) $56\overline{)857}$ (c) $47\overline{)1325}$ (d) $35\overline{)714}$
   (e) $71\overline{)3550}$ (f) $41\overline{)2480}$ (g) $86\overline{)6025}$ (h) $43\overline{)8795}$
8. Give situations in daily life that require division and present it in class

Exercise 2.3

1. A book has 100 pages. If Sadhna has read 56 pages, how many pages remain to be read?
2. A school hall has 270 benches. If 5 students can sit on a bench, how many students can be seated in the hall?
3. A chair costs Rs. 725 and a central table Rs 1250. If Sunita bought 4 chairs and a central table, how much money should she pay to the shopkeeper?
4. Rajan bought 18 roses each costing 6 rupees.
   (a) How much money he should pay to the shopkeeper?
   (b) If he paid 120 rupees to the shopkeeper, how much money the shopkeeper should return to him?
5. A carton can hold 12 boxes of candles each of which contains 10 candles, Ronit bought 4 cartons of candles for Diwali, how many candles did he buy?
6. Eight boys went for a picnic that cost them Rs.72 If they share the expenses equally, how much would each have to pay.
7. Kamal had a 70-rupees and he wants to buy notebooks each costing 8 rupees. Find the maximum number of notebooks he can buy and the money the shopkeeper should return to him?
8. Twenty-four persons can be seated in a mini bus. If 228 persons want to go for a picnic, how many mini buses would be needed?
9. Annu bought a bag of sweets to distribute to her classmates on her birthday. The bag contained 125 sweets, she gave 4 sweets to each and 5 sweets were left over. How many children were present that day?
10. A car uses 2 litres of petrol for traveling 30 kilometres. How much petrol would it need for traveling 75 kilometres?
11. In the questions given below, solve them if enough information is given. If enough information is not given, point out what information is needed to solve the problem.
    (a) Bill bought 4 bottles of Pepsi cola at Rs. 18 each. How much change he should get from the shopkeeper?
    (b) If a carton holds 12 eggs, how many cartons you should buy to have 48 eggs?
    (c) How many cars will be needed to transport 42 children?
    (d) A garland has 45 pearls. If you want to make 25 such garlands, how many pearls would you need?
12. Make up stories that require the following calculations:
    (a) 70 + 50
    (b) 30 ÷ 6 =
    (c) 20 - 7 =

(d) 50 - (6 +8)
(e) 100 H 8

13. How do you use mathematics in daily life? Write an essay on it and present it in class.
14. For each of the following tell what number am I or what numbers are we?
(a) We are a pair of numbers. Our product is 63. We just differ by 2.
(b) If you find 40 times me, divide the product by 4 and you will see 700.
(c) To find out who am I, I will give just one clue, I am as much more than 6 as I am less than 56.
(d) I am a special number with three digits and no more. Increase me just by one and the digit count is 4
(e) Finding nine times forty is as simple as can be. You just find nine times four, and then multiply by me.
(f) Add me to myself and multiply by four. When you divide by eight, you will have me once more.

Activity: Take up any number and ask the students to get that as an answer by using different operations or combination of operations.

The answer to all these mathematical statements using different operations is 13:

(a) 4 + 4+ 5 = 13.

(b) 20 - 7 = 13.

(c) 2 × 5 + 3 = 13.

(d) 100 ÷ 5 - 7 = 13.

We can make up different stories for these statements. For example, for

(a) Rani, Sudha and Avani went for a walk on the beach. Rani found 5 shells, Sudha 4 and Avani 4. They found 13 shells in all.

(b) Rajan had 20 rupees, he bought a chocolate for Rs.7. Now 13 rupees are left with him.

(c) Mukesh walked 2 km for 5 days and 3 km on sixth day. He walked 13 km in all.

(d) A flower girl had 100 roses. She tied these into bunches of 5 flowers and sold 7 of these. Now she has 13 bunches of flowers.

Take up different numbers and write mathematical statements using different operations or combination of operations. And make up stories for those.

Appendix 1-Mastery Test in Multiplication Facts

Multiply

6 × 3 ------ ------	4 × 6 ------ ------	2 × 2 ------ ------
5 × 4 ------ ------	8 × 4 ------ ------	3 × 9 ------ ------
4 × 2 ------ ------	7 × 0 ------ ------	5 × 3 ------ ------
3 × 7 ------ ------	6 × 7 ------ ------	2 × 6 ------ ------
7 × 7 ------ ------	5 × 5 ------ ------	7 × 5 ------ ------
3 × 8 ------ ------	4 × 7 ------ ------	4 × 7 ------ ------
3 × 3 ------ ------	7 × 0 ------ ------	9 × 1 ------ ------

8	2	2
× 1	× 7	× 9
------	------	------
------	------	------
2	4	2
× 5	× 9	× 3
------	------	------
------	------	------
3	2	5
× 4	× 8	× 9
------	------	------
------	------	------
5	8	9
× 6	× 5	× 6
------	------	------
------	------	------
8	4	8
× 6	× 4	× 9
------	------	------
------	------	------
7	5	9
× 9	× 9	× 9
------	------	------
------	------	------
6	7	8
× 6	× 8	× 8
------	------	------
------	------	------

Appendix 2-Mastery Test on Division Facts

$6 \div 2$	$5 \div 5$	$9 \div 3$
$12 \div 4$	$8 \div 4$	$18 \div 2$
$10 \div 5$	$20 \div 4$	$24 \div 6$
$20 \div 5$	$30 \div 6$	$27 \div 3$
$12 \div 6$	$8 \div 2$	$15 \div 5$
$12 \div 2$	$21 \div 3$	$24 \div 8$
$14 \div 7$	$20 \div 5$	$63 \div 7$
$30 \div 5$	$12 \div 3$	$6 \div 3$
$8 \div 8$	$10 \div 2$	$28 \div 4$
$18 \div 9$	$14 \div 2$	$28 \div 7$
$0 \div 3$	$25 \div 5$	$36 \div 9$
$21 \div 7$	$16 \div 4$	$35 \div 5$
$24 \div 4$	$24 \div 3$	$48 \div 6$
$36 \div 6$	$36 \div 4$	$6 \div 1$
$40 \div 5$	$32 \div 8$	$72 \div 9$
$4 \div 2$	$42 \div 6$	$56 \div 8$
$18 \div 6$	$45 \div 5$	$40 \div 8$
$15 \div 3$	$42 \div 7$	$63 \div 9$
$32 \div 4$	$16 \div 2$	$49 \div 7$
$35 \div 7$	$48 \div 8$	$54 \div 6$
$16 \div 8$	$56 \div 7$	$81 \div 9$
$27 \div 9$	$45 \div 9$	$72 \div 8$
$18 \div 3$	$49 \div 7$	$54 \div 9$

UNIT 3

Highest Common Factor and Lowest Common Multiple

Multiples

The product of a number by any number is called a multiple of the number. For example, if we multiply 1, 2, 3, 4, 5… by 5, we get. 5, 10, 15, 20, 25… All products that is, 5, 10, 15, 20, 25…are multiples of 5.

A number can have any number of multiples

Factors

If a number divides another number without a remainder, the number is said to be a factor of the other number. We will restrict to two-digit numbers only.

$42 \div 7 = 6$, therefore 7 is a factor of 42.

We also know that if $42 \div 7 = 6$, $42 \div 6 = 7$, therefore the quotient 6 is also a factor of that number.

A number except 1 has 2 or more factors.

When we multiply two or more than two numbers, each number is a factor of the product.

For example, $6 \times 7 = 42$, 6 and 7 are both factors of 42.

Similarly as $2 \times 3 \times 4 = 24$, 2, 3, and 4 are factors of 24.

Finding all factors of a number

A number has only a limited number of factors

While we can find all factors of a number by dividing the number by 1, 2, 3, 4, and so on and checking whether it is divisible or not. We can use some generalizations to shorten our work. These are

- As any number divided by 1 = the number, One is a factor of any number and is the smallest factor.
- As any number divided by the number itself = 1, the number itself is a factor of any number and is the greatest factor.
- As the digit in one's place in all multiples of 10 is 0, 10 is not a factor of a number that does not end in 0.
- As the digit in one's place in all multiples of 5 is 5 or 0, 5 is not a factor of a number that does not end in 0 or 5.
- As all multiples of 2 are even, 2 it is not a number a factor of any odd number.
- As all multiples of even number are even, any even numbers is not a factor of any odd number.
- As the digit in one's place in all multiples of 5 is 5 or 0, 5 is not a factor

of a number that does not end in 0 or 5.

- If any divisor is a factor of the number, then the quotient is also the factor. That is if 7 is a factor of 63, the quotient 9 obtained by dividing 63 by 7 is also a factor.
- We stop checking higher numbers when the quotient and divisor are interchanged.

Example 1

Find all factors of 30

As $30 \div 2 = 15$, 2 and 15 are factors of 30.

As $30 \div 3 = 10$, 3 and 10 are factors of 30.

As $30 \div 4 = 30/4 = 15/2 = 7\frac{1}{2}$ (a mixed number), 4 is not a factor of 20.

As $30 \div 5 = 6$, 5 and 6 are factors of 30.

As $30 \div 6 = 5$ and $30 \div 5 = 6$, we stop here as the divisor and quotient are interchanged.

All factors of 30 are 1, 2, 3, 5, 6, 10, 15 and 30.

Example 2

Find all factors of 25

As 25 is odd, 2 is not a factor of 25

As $25 \div 3 = 8\frac{1}{3}$, 3 is not a factor of 25.

As 25 is an odd number, 4 is not a factor of 25

As $25 \div 5 = 5$, 5 is a factors of 25.

As 25 is an odd number, 6 is a not a factors of 25.

We stop here as 6 the quotient of $25 \div 4$ is the divisor here and divisor 4 is the quotient here.

If a number is a factor of a number, all its factors are also factors of the number. That is if 6 is a factor of 60, all its factors 1, 2, 3 and 6 are also its factors. (Verify it)

Exercise 3.1

1. Write the first 10 multiples of 2.Are all these numbers even?
2. Write the first 10 multiples of 5, what you notice about the digit in one's place.
3. Write the first ten multiples of 10, what you notice about the digit in one's place.
4. Write the first 5 multiples of 100.
5. Write the first 5 multiples of 1000.
6. Which of the following numbers are multiples of 10?
   1, 40, 45, 60, 700.
7. Fill in blanks:
   (a)_____and _________ are factors of any number.
   (b)________is a multiple of any number.
   (c) All multiples of even numbers are _______.
   (d) _______is a factor of all even numbers.
8. Name the digits in one's place of
   (a) even numbers
   (b) odd numbers
   (c) multiples of 5
   (d) multiples of 10.
9. Which of the following numbers are even?
   3, 6, 17, 20, 45, 64, 69
10. Which of the following numbers are odd?
    1, 63, 58, 57, 34, 91, 40
11. (a) Is 3 a factors of 11?
    (b) Is 7 a factors of 63?
    (c) Is 8 a factors of 56?
12. For which of the numbers 21, 30, 45, 53 you can rule out the factors given below without dividing and why?
    (a) 2
    (b) 5
    (c) 4
    (d) 10
    (e) 6
13. Encircle every 7^{th} number and every 8^{th} number in the hundred table in Activity Sheet 1. Were any of the numbers encircled twice? What does it mean?
14. If a number is not a factor of a number, all its multiples are also not

factors of the number. That is if 5 is not a factor of 63, all its multiples 5, 10, 15…are also not its factors. (Verify it)

15. If 8 is a factor of a number would 4 necessarily be a factor of that number? If no, give a counter example.
16. If 4 is a factor of a number would 8 necessarily be a factor of that number? If no, give a counter example.
17. Find all factors of

    a) 16 b) 30 c) 24 d) 40

Highest common factor (HCF)

We can find common factors of two or more numbers by finding all their factors and naming the ones that are common to both or all. Among the common factors, one with highest value is called **highest common factor**.

Example 3

Find highest common factor of 10 and 25.

All factors of 10 are 1, 2, 5 and 10.

All factors of 25 are 1, 5 and 25.

The common factors are 1 and 5.

Therefore, the highest common factor is 5

Example 4

Find highest common factor of 7 and 25.

All factors of 7 are 1 and 7

All factors of 10 are 1, 2, 5 and 10.

Common factor is 1.

Therefore, the highest common factor is 1.

Example 5

Find highest common factor of 20, 24 and 40.

All factors of 20 are 1, 2, 4, 5 and 10

All factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24

All factors of 40 are 1, 2, 4, 5, 8, 10, 20 and 40.

Common factors of 20, 24 and 40 are 1, 2 and 4.

Therefore, the highest common factor is 4.

Finding all common factors is a cumbersome procedure; we can also find highest common factor of two or more numbers by finding there prime factorisation.

Lowest common multiple (LCM)

We can find as many multiples of a number as we want. The multiples that are common to the two numbers are called **common multiples**. The smallest of common multiple is called the **lowest common multiple (LCM).** We can find LCM by listing the multiples of two numbers, finding common multiples; the smallest among these is the LCM. For example,

Multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60…

Multiples of 8 are 8, 16, 24, 32, 40, 48, 56, 64, 72, 80…

Common multiples of 6 and 8 are 24, 48…

LCM of 6 and 8 is 24

Example 9

Find the LCM of 5 and 10

Multiples of 5 are 5,10, 15, 20, 25, 30…

Multiples of 10 are 10, 20, 30, 40, 50…

Common multiples of 5 and 10 are 10, 20, 30…

LCM of 5 and 10 is 10.

Example 10

Find LCM of 3 and 7.

Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30…

Multiples of 7 are 7, 14, 21, 28, 35, 42, 49, 56, 63, 70…

Common multiples of 3 and 7 is 21.

LCM of 3 and 7 is 21.

Exercise 3.2

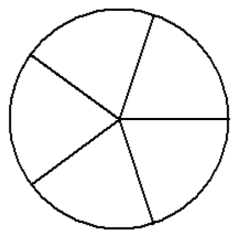
1. Find first 5 multiples of the numbers given below:
   (a) 3 (b) 7 (c) 9 (d) 12 (e) 20
2. Find two common multiples of the numbers given below:
   (a) 3 and 4 (b) 6 and 8 (c) 12 and 15
3. Find the LCM of the numbers given below:
   (a) 2 and 3 (b) 5 and 7 (c) 3 and 11
   (d) 3 and 5 (e) 3 and 7 (f) 2 and 13
   (g) Can you state a relationship between numbers and LCM.
   (h) Would it hold for any two numbers? If no, for what type of numbers would it hold?
4. Find the LCM of the numbers given below:
   (a) 3 and 9 (b) 2 and 4 (c) 6 and 12
   (d) 2 and 8 (e) 10 and 20 (f) 11 and 22
   (g) Can you state a relationship between these numbers and LCM.
   (h) Would it hold for any two numbers? If no, for what type of numbers would it hold?
5. Find the LCM of the numbers given below:
   (a) 4 and 6 (b) 12 and 20 (c) 30 and 50
   (d) 24 and 36 (e) 48 and 60 (f) 56 and 64
6. Find the LCM, HCF and product of LCM and HCF of the numbers given below:
   (a) 4 and 8 (b) 24 and 20 (c) 20 and 70
   (d) Do you notice a relationship between the product of LCM, HCF and the numbers? If yes, what is it?

UNIT 4

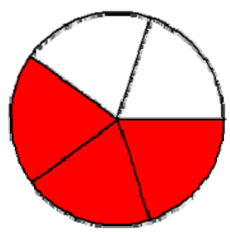
Fractions

Regional model

If a figure can be divided into a numbers of equal parts say 5 then each part is one-fifth of the original figure.

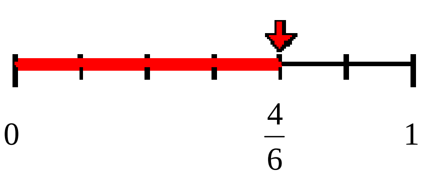


Three equal parts that are coloured represent three-fifths of the original figure. We write it as $\frac{3}{5}$



In a fraction the down number is called **denominator** and tells how many fair shares are in the whole object and that the top number is called **numerator** and tells how many of the shares are being talked about. For example, in $\frac{3}{5}$, 3 is the numerator and 5 is the denominator.

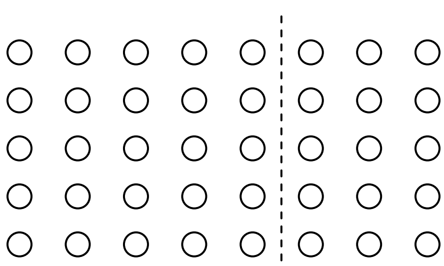
We can also show a fraction on a number line by dividing the distance between 0 and 1 into as many parts as the denominator and colouring as many parts as the numerator. For example the figure given below shows $\frac{4}{6}$



Set Model

If we can divide a number of objects say 20 into 5 equal subsets of objects, we say each subset is one-fifth of the original collection. For example, the dashed lines divide the 20 stars into 5 equal subsets. The number of stars in each subset is one-fifth of 20 and is 4 in this case. This is the same as dividing by 5. The number of stars in 2 subsets is two-fifth of 20 and is 8. The number of stars in 3 subsets is three-fifth of 20 and is 12. The number of stars in 4 subsets is four-fifth of 20 and is 16. The number of stars in 5 subsets is 20 is five-fifth of 20.We can find the number of stars in any number of subsets by multiplying the number of stars in one subset by the number. We can write these as $\frac{1}{5}\times 20 = 4$, $\frac{2}{5}\times 20 = 8$, $\frac{3}{5}\times 20 = 12$, $\frac{4}{5}\times 20 = 16$ and $\frac{5}{5}\times 20 = 20$.

We can find the number of objects in a fractional part say 5/8 of a collection having 40 objects by arranging 40 objects in an array with 5 rows and 8 columns with 8 objects in each row and counting the number of objects in 5 columns.



As the number of objects in 5 columns is 25, therefore five eighth of 40 is 25.

Alternatively, we can find the number of objects in one-eighth of the collection by dividing 40 by 8 and multiply that by 5. As $40 \div 8 = 5$ and $5\times 5 = 25$, therefore five eighth of 40 is 25.

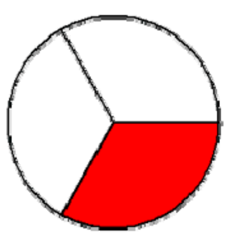
Like and unlike fractions

The fractions with the same denominator are called like fractions e.g. $\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{8}{8}$.

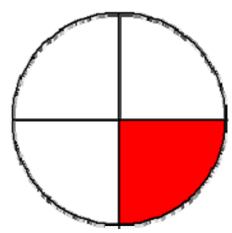
The fractions with different denominators are called unlike fractions e.g. 2/3, 4/7.

Unit fractions

The fractions that have 1 as a numerator such as $\frac{1}{3}$, $\frac{1}{4}$ are called unit fractions. These represent one part out of a number of parts into which a whole is divided.



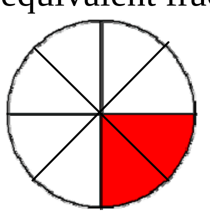
$\frac{1}{3}$



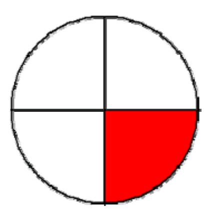
$\frac{1}{4}$

Equivalent fractions

The fractions that represent equal part of a region or collection are called equivalent fractions.



$\frac{2}{8}$

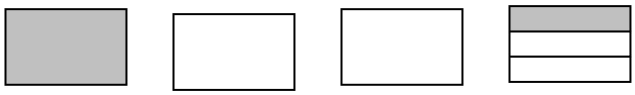


$\frac{1}{4}$

The coloured portion represents $\frac{2}{8}$ in the first figure and $\frac{1}{4}$ in the second figure. As these represent equal parts of a region, these are equivalent fractions.

Proper and improper fractions

A fractions in which denominator is greater than numerator is called a proper **fraction** e.g. 4/6, 7/8, 2/9.
A fractions in which numerator is greater than denominator is called **improper fraction** e.g. 3/2, 7/4, 8/3. For example, 4/3 represents 1/3 of 4 wholes. Let a rectangle represent one whole, then 4 rectangles would represent 4 wholes and one third of these is the shaded region.



The shaded part is $\frac{3}{3}+\frac{1}{3}=\frac{3+1}{3}=\frac{4}{3}$

We can also express it as $1+\frac{1}{3}=1\frac{1}{3}$. Such numbers that are a combination of a whole number and a fraction are called **mixed numbers**.

Comparison of fractions

Use of a fraction chart

We can use a fraction chart like the one given below in which equal strips are divided into a number of equal parts to compare the fractions.

One whole							
1/2	1/2						
1/3	1/3	1/3					
1/4	1/4	1/4	1/4				
1/5	1/5	1/5	1/5	1/5			
1/6	1/6	1/6	1/6	1/6	1/6		
1/7	1/7	1/7	1/7	1/7	1/7	1/7	
1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8

If we take green strip as one whole, then each yellow strip is ½, two yellow strips are 2/2 or 1. Similarly each orange strip is 1/3, two orange strips are 2/3, 3 orange strips are 3/3 or 1 and so on.

Comparison of like fractions

Like fractions refer to different number of parts of the same strip. The fraction chart shows that for any strip say red $\frac{1}{7}<\frac{2}{7}<\frac{3}{7}<\frac{4}{7}<\frac{5}{7}<\frac{6}{7}<\frac{7}{7}$.

That is among fractions with the same denominator one with larger numerator is larger.

Comparison of fractions with the same numerator

The fractions with the same numerator refer to same number of parts of different strips e.g. 2/3, 2/5, 2/7. The fraction chart shows that 2/3 > 2/5 >

2/7. That is among fractions with the same numerator as the denominator of a fraction increases it becomes smaller.

Comparison of unit fractions

Unit fractions refer to one part of the strips divided into different number of parts. The fraction chart shows

1/2 > 1/3 > 1/4 > 1/5 > 1/6 1/7 > 1/8.

That is as the denominator of a fraction increases it becomes smaller.

Comparison of unlike fractions

We can compare fractions with denominators up to 8 by the fraction chart given above by finding the strips that represent two fractions and then comparing their length. For example $\frac{1}{3} < \frac{1}{2}$ as orange strip is smaller than the yellow strip; $\frac{2}{3} > \frac{1}{2}$ as length of two orange strips is greater than one yellow strip.

Equivalent fractions

If length of strips represented by two fractions is the same, they are called equivalent fractions. For example, strips that show $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}$ have the same length and hence are equivalent.

What do you notice about these fractions? (The top number is 1/2 of the denominator, all of them have even bottom numbers).

Can you identify other fractions for which there are fraction strips that are the same as 1/2 based on this pattern? (5/10, 6/12, 10/20…)

Use of rules

We can write

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$ as

$\frac{1}{2} = \frac{1\times 2}{2\times 2} = \frac{1\times 3}{2\times 3} = \frac{1\times 4}{2\times 4}$

That is we can obtain equivalent fractions by multiplying the numerator and denominator of a fraction by the same number. This holds for any fraction.

We can also write

$\frac{2}{4} = \frac{2\div 2}{4\div 2} = \frac{1}{2}$

$\frac{3}{6} = \frac{3\div 3}{6\div 3} = \frac{1}{2}$

$\frac{4}{8} = \frac{4\div 4}{8\div 4} = \frac{1}{2}$

We can obtain equivalent fractions by dividing the numerator and denominator of a fraction by their common factor.

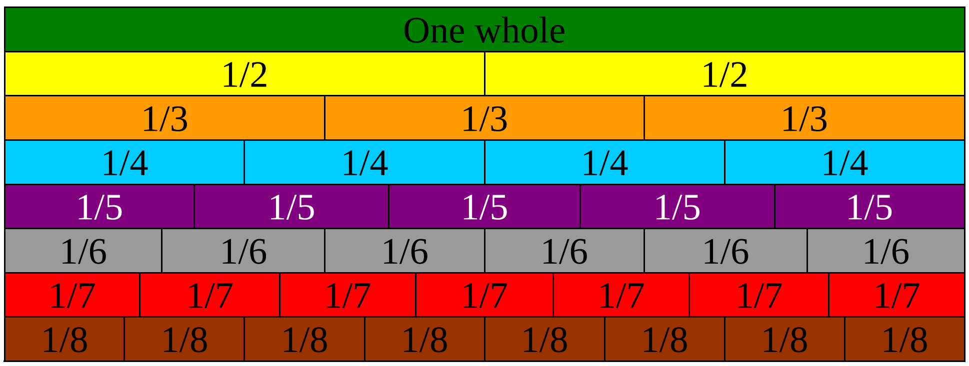
We can check if fractions are equivalent or not by finding cross products of the numerator of one fraction with denominators of the other fraction. Fractions are equivalent only if the two cross products are equal. For example,

$\frac{5}{8}$ *and* $\frac{15}{24}$ *are equivalent* as $24 \times 5 = 15 \times 8 = 120$.

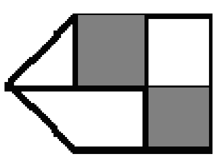
$\frac{4}{7}$ *and* $\frac{8}{17}$ *are not equivalent* as $4 \times 17 = 68$ *and* $7 \times 8 = 56$

Exercise 4.1

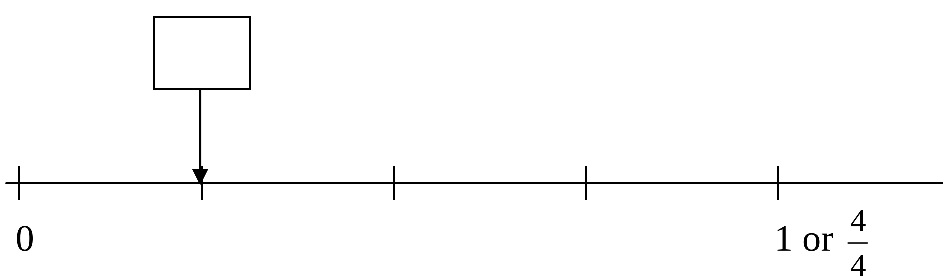
1. In the fraction chart given below what fraction is represented by the following:
   (a) 2 orange strips (b) 3 red strips
   (c).5 red strips (d) 1 orange strip
   (e) 1 yellow strip (f) 2 blue strips



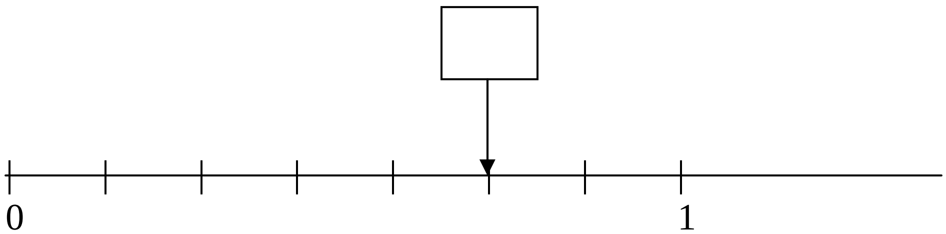
2. There may be more than one correct answer, write all of them
   (a) Which of the fractions are unit fractions in Question 1?
   (b)Which of the fractions are like fractions in Question 1?
   (c) Which of the fractions are unlike fractions Question 1?
   (d) Which of the fractions are equivalent fractions in Question 1?
3. What fraction of the shape is shaded? (Hint: break it into smaller pieces)



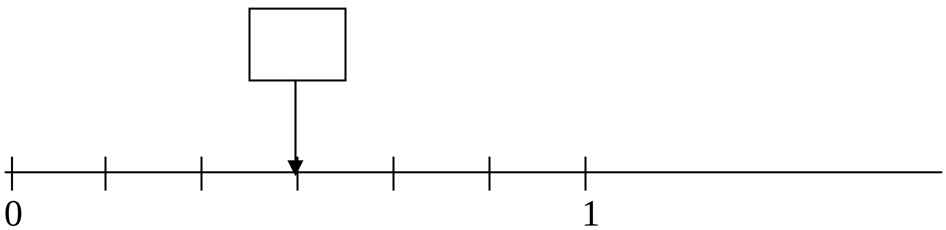
4. Look carefully at the number lines given below and write the appropriate fraction in the box.

(a)


(b)



(c)



5. Find the following(You may use counters or drawings of counters):

(a) $\frac{3}{4} of 16$ (b) $\frac{1}{4} of 12$ (c) $\frac{2}{3} of\ 9$ (d) $\frac{1}{5} of 10$

(e) $\frac{3}{8} of 16$ (f) $\frac{3}{7} of 35$ (g) $\frac{2}{9} of 27$ (h) $\frac{7}{10} of\ 40$

6. Use fraction chart to find fractions that are equivalent to the following fractions:

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{2}{8}$ (d) $\frac{4}{6}$

7. Use fraction chart to compare the following fractions by writing '>, <, or = in the space between fractions.

(a) $\frac{2}{6}$ $\frac{5}{6}$ (b) $\frac{1}{6}$ $\frac{1}{8}$ (c) $\frac{1}{2}$ $\frac{1}{3}$ (d) $\frac{2}{8}$ $\frac{2}{6}$

(e) $\frac{2}{3}$ $\frac{1}{2}$ (f) $\frac{3}{4}$ $\frac{1}{2}$ (g) $\frac{6}{7}$ $\frac{5}{6}$ (h) $\frac{4}{6}$ $\frac{2}{3}$

8. Arrange the following fractions in ascending order:

(a) $\frac{1}{3},\frac{3}{3},\frac{2}{3}$ (b). $\frac{3}{4},\frac{2}{4},\frac{7}{4}$ (c) $\frac{4}{10},\frac{7}{10},\frac{2}{10}$

9. Arrange the following fractions in descending order:

(a) $\frac{2}{5},\frac{4}{5},\frac{3}{5}$ (b) $\frac{2}{8},\frac{4}{8},\frac{3}{8},\frac{7}{8}$ (c) $\frac{6}{12},\frac{10}{12},\frac{5}{12}$

10. Arrange the following fractions in ascending order:

(a) $\frac{1}{4},\frac{1}{8},\frac{1}{7}$ (b) $\frac{1}{5},\frac{1}{6},\frac{1}{2}$ (c) $\frac{1}{9},\frac{1}{12},\frac{1}{7}$

11. Arrange the following fractions in descending order

(a) $\frac{3}{6}, \frac{3}{7}, \frac{3}{4}$ (b) $\frac{2}{3}, \frac{2}{8}, \frac{2}{5}$ (c) $\frac{6}{15}, \frac{6}{8}, \frac{6}{10}$,

12. Use fraction chart to find

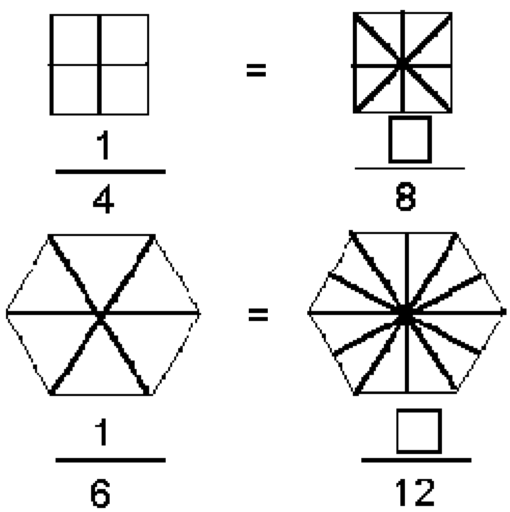
(a) Which fraction is closest to 1- 2/3, 4/5, 6/7, 7/8

(b) Which fraction is closest to 1/2-2/3, 3/5, 4/7, 5/8

(c) Which fraction is closest to 3/4-1/2, 2/3, 7/8

(d) Which fraction is closest to 1/4- 1/3, 1/5, 2/7

13. Shade in the equivalent fractions.



16. Which of the following are mixed numbers?

(a) $1\frac{2}{3}$ (b) $\frac{8}{5}$ (c) $4\frac{2}{5}$ (d) $\frac{10}{6}$ (e) $\frac{6}{9}$

17. Write 3 mixed numbers.

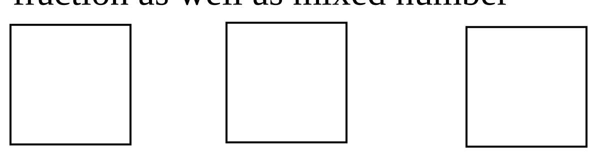
18. Convert the following improper fractions into mixed numbers.

(a) $\frac{3}{2}$ (b) $\frac{10}{8}$ (c) $\frac{5}{3}$ (d) $\frac{9}{4}$ (e) $\frac{14}{5}$

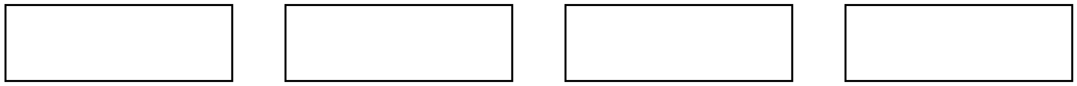
19. Convert the following mixed numbers into improper fractions.

(a) $2\frac{3}{4}$ (b) $1\frac{6}{7}$ (c) $3\frac{3}{4}$ (d) $2\frac{1}{7}$

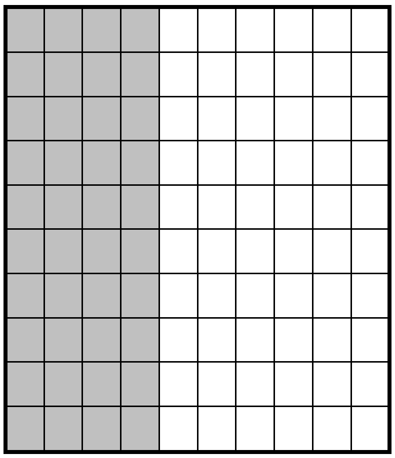
20. Divide the following into 2 equal parts, shade one part and write it as improper fraction as well as mixed number



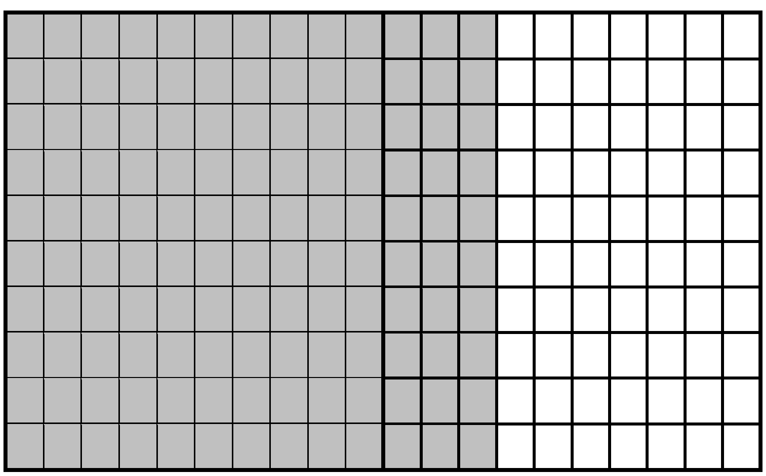
21. Divide the following into 3 equal parts and shade one part and write it as improper fraction as well as mixed number



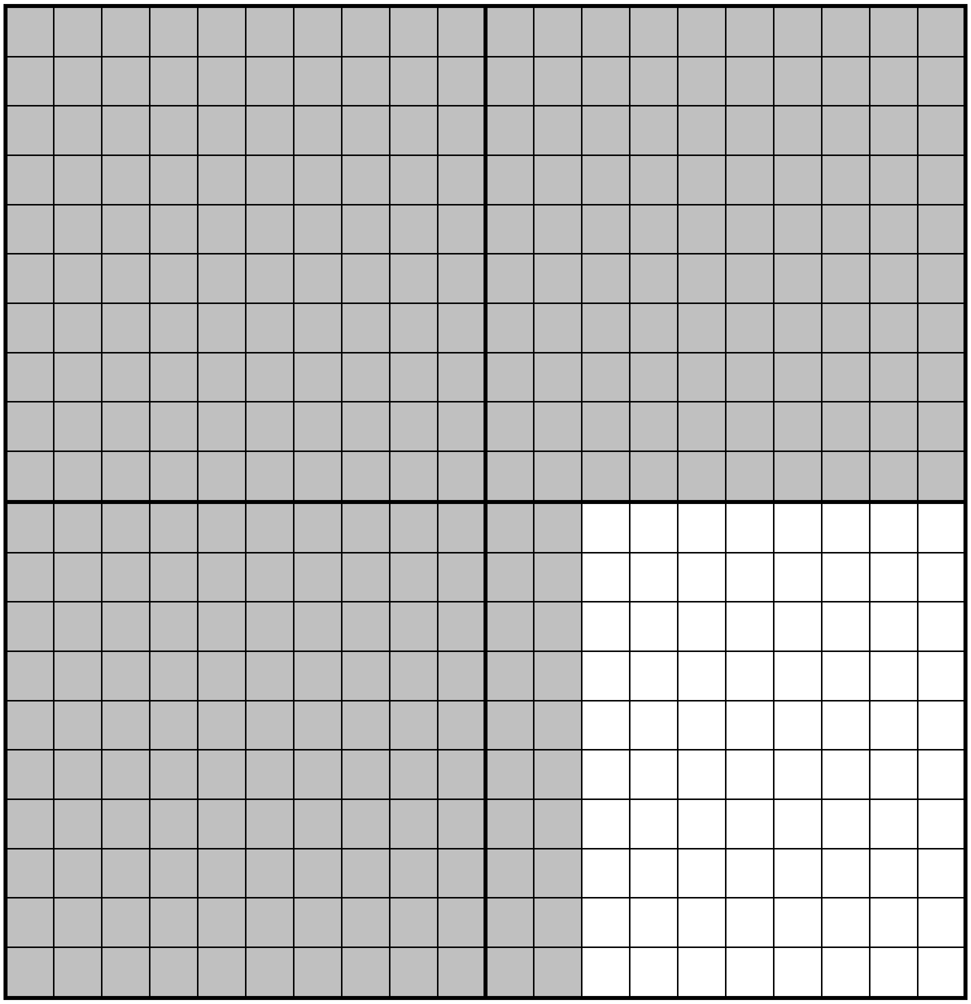
Decimals
Decimals are special fractions that have 10, 100, 1000 and so on as a denominator
Concept of decimals Tenths
We can show these by marking a 10×10 grid on the graph paper.



Take the square with thick border as a unit.
Each long divides it into 10 equal parts or is 1/10 of the whole.
In the above grid 4 longs are shaded or 4/10 or 0.4 of the grid is shaded.
Decimals larger than 1



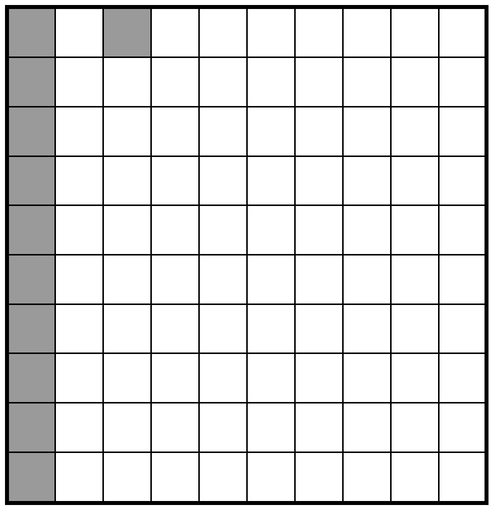
If our unit is big square, we have one unit and three tenths shaded. We may write it as $1\frac{3}{10}$ or 1.3.
We can show 3.2 by using four 10×10 squares on a graph paper and shading 3 whole squares and 2 longs in the fourth square



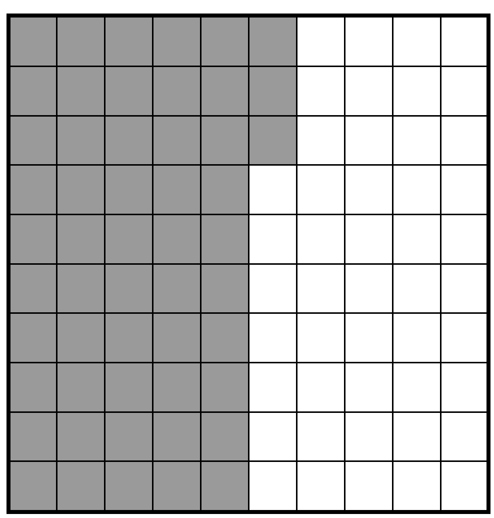
Exercise 4.2

1. Write the following fractions as decimals:
   (a) 1 unit and 2 tenths (b) 2 units
   (c) 0 units and 6 tenths (d) 5 tenths
2. Write the following decimals in words:
   (a) 0.4 (b) 1.8 (c) 2.0 (d) 3.9 (e) 24.9
3. Shade the following portion in Activity Sheet 4.1 using 10 × 10 grid as a unit.
   (a) 0.6 (b) 1.5 (c) 2.7 (d) 2.0
4. Write the following in decimals:
   (a) zero point five (b) one point six (c) ten point four
5. Write the following decimals as fractions:
   (a) 0.7 (b) 1.4 (c) 2.3 (d) 5.0 (e) 10.3
6. Write the following fractions as decimals:
   (a) $\frac{3}{10}$ (b) $2\frac{6}{10}$ (c) $3\frac{9}{10}$ (d) $\frac{2}{5}$

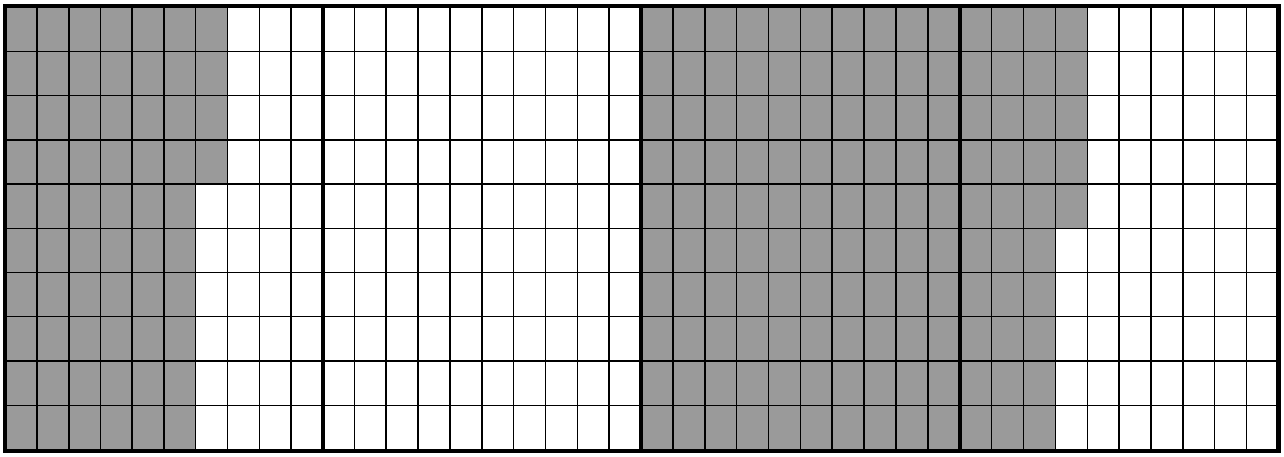
Concept of decimals-Hundredths Think of the 10 × 10 square in your graph paper notebook as one unit.



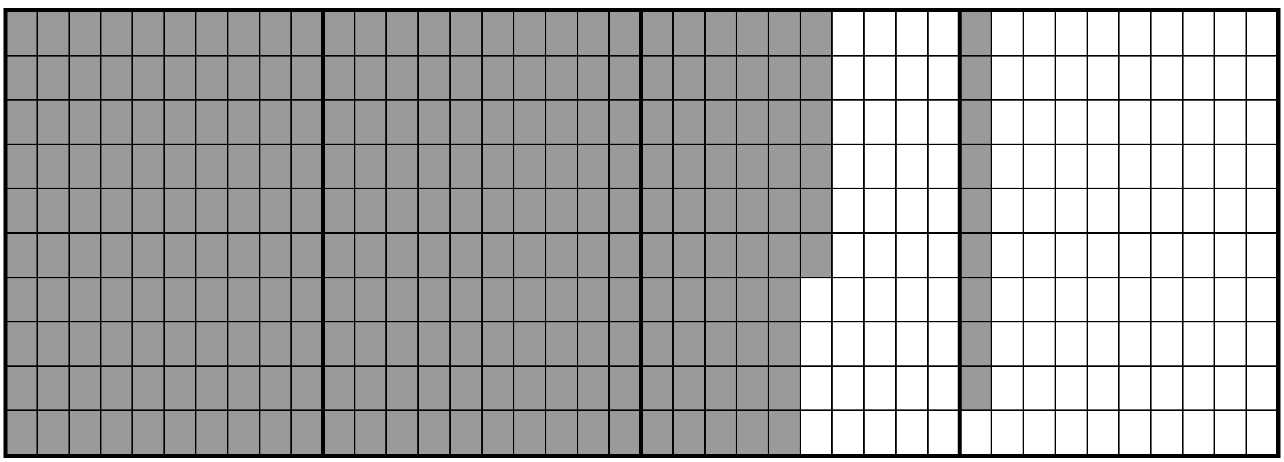
1. Each square represents one unit.
2. The long shaded part represents one tenth. There are ten hundredths in one long.
3. Each small square -a short represents one hundredth of the unit
4. Hundredths are written to the right of the tenths column when writing numbers in figures. That is we write units, decimal point, tenths and hundredths from left to right.



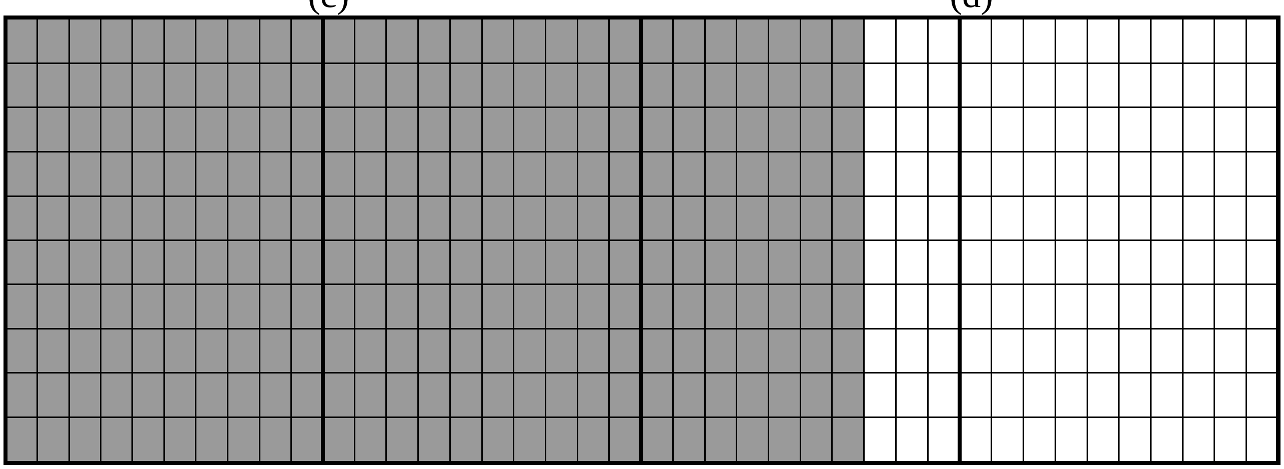
In the above graph 0 units, 5 tenths and 3 hundredths or 53 hundredths are shaded. We write it as 0.53 and read it as zero (units) point five (tenths) three (hundredths) (Not zero point fifty three).



(a) (b)



(c) (d)



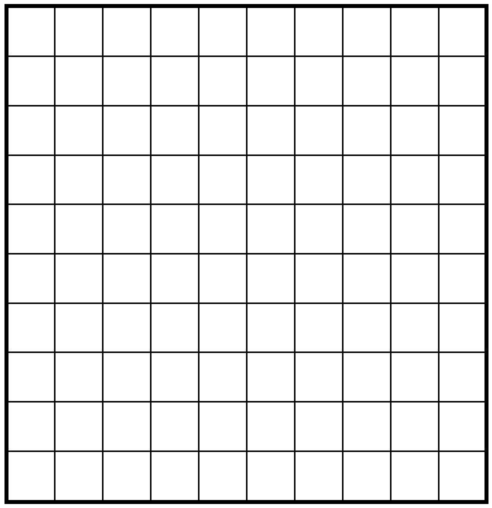
(e)

In the above graph in

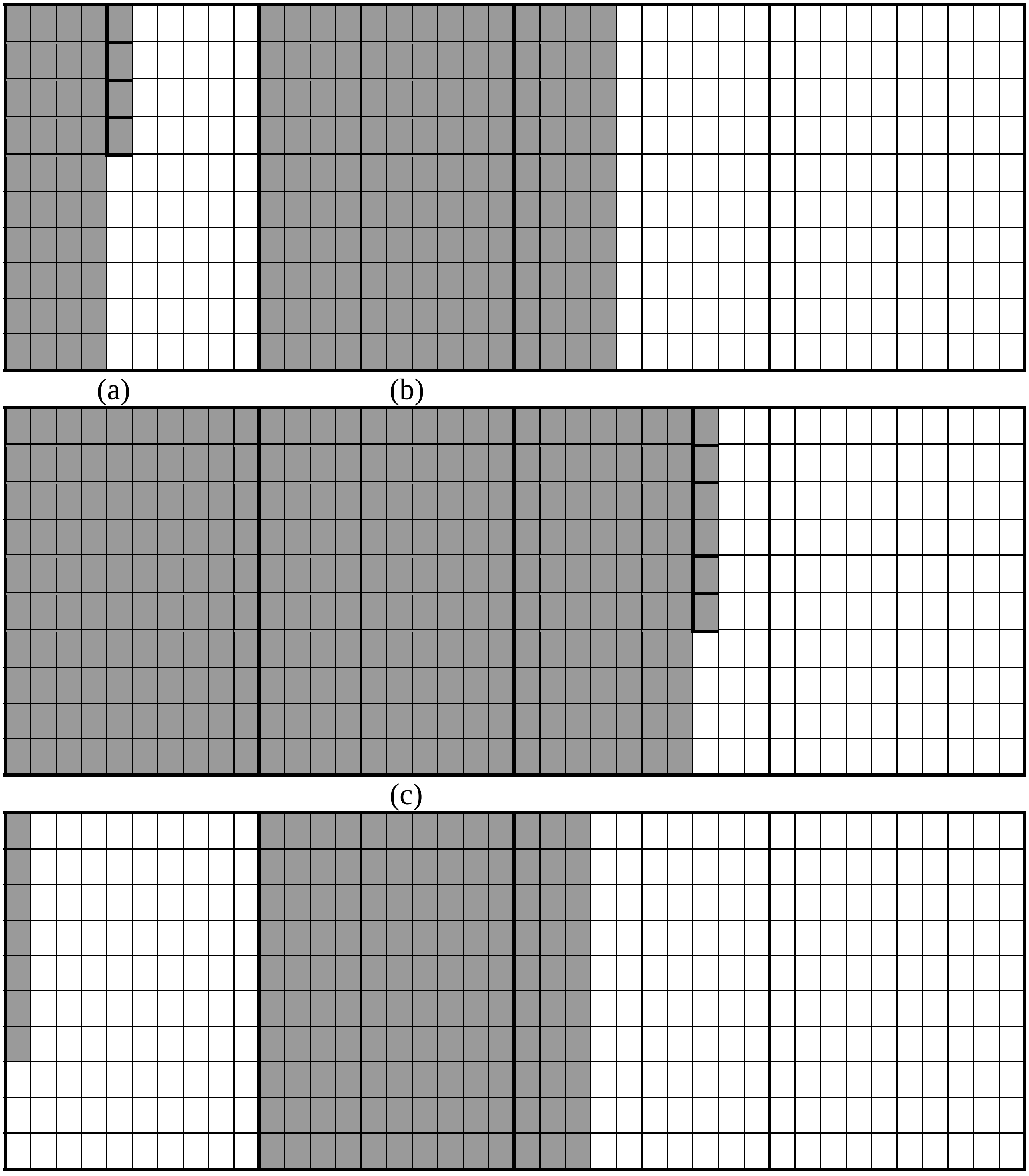
- (a) 0 units, 6 tenths and 4 hundredths or 64 hundredths or $\frac{64}{100}$ is shaded. We write it in decimals as 0.64.We read it as zero point six four (Not zero point sixty four).
- (b) 1 units, 3 tenths and 5 Hundredths or one unit and 35 hundredths or $1\frac{35}{100}$ are shaded. We write it in decimals as 1.35.We read it as one point three five (Not one point thirty five).
- (c) 2 units, 5 tenths and 6 Hundredths or 2 units and 56 hundredths or $2\frac{56}{100}$ are shaded. We write it in decimals as 2.56. We read it as two point five six (Not two point fifty six).
- (d) 8 Hundredths or $\frac{8}{100}$ are shaded. As there are 0 units, 0 tenths and 8 hundredths. We write it in decimals as 0.08.We read it as zero point zero eight.
- (e) 2 units, 7 tenths and 0 Hundredths or 2 units and 70 hundredths or $2\frac{7}{10} or 2\frac{70}{100}$ are shaded. We read it as two point seven zero (Not two point seventy). We write it as 2.70, 2.70 is the same as 2.7. We don’t have to write in the zero, but it is good practice to write it

Exercise 4.3

1. Taking the square with thick border as a unit show by shading
   (a) one tenth (b) one hundredth



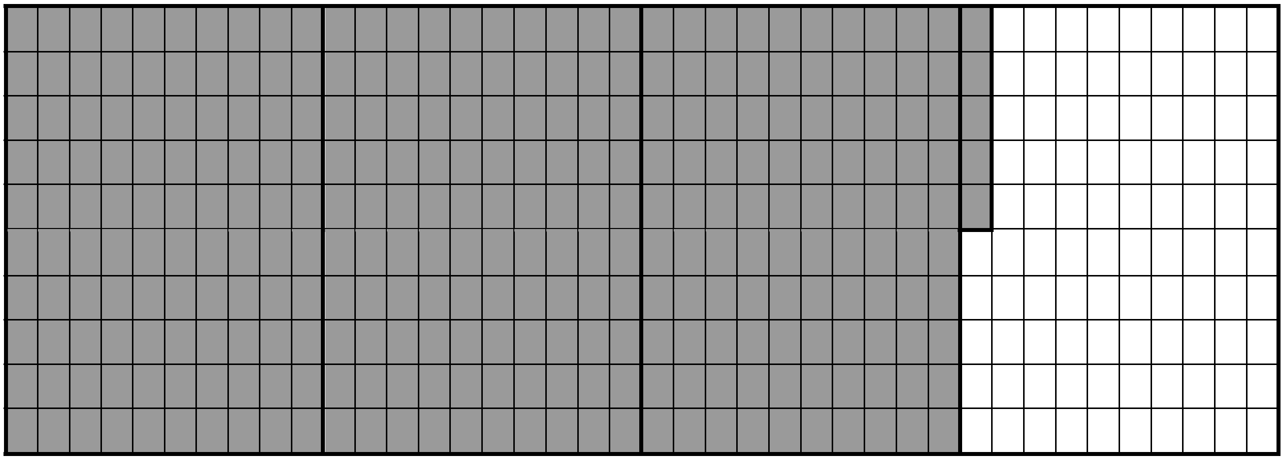
2. Write the following decimal numbers in words:
   (a) zero point five (b) Two point seven
   (c) Thirteen point six (d) Zero point six two
   (e) Ten point four five (f) sixty four hundredths
   (g) Forty hundredths (h) Three hundredths
3. Write the following decimal numbers in figures:
   (a) 0.8 (b) 7.6 (c) 8.0 (d) 15.9 (e) 76.8
   (f) 0.78 (g) 8.45 (h) 9.50 (i) 45.07 (j) 0.04
4. Write the following fractions as decimals:
   (a) $\frac{7}{10}$ (b) $5\frac{6}{10}$ (c) $10\frac{9}{10}$ (d) $4\frac{3}{5}$ (e) $2\frac{1}{2}$
   (f) $\frac{73}{100}$ (g) $4\frac{56}{100}$ (h) $\frac{50}{100}$ (i) $74\frac{67}{100}$ (j) $\frac{8}{100}$
5. Write the following decimals as fractions:
   (a) 0.4 (b) 2.7 (c) 3.5 (d) 6.2
   (e) 0.49 (f) 6.78 (g) 7.50 (h) 23.03
6. In the graph given below, taking the square with thick border as a unit write in decimal notation the parts which are shaded:



(a) (b)

(c)

(d) (e)



(f)

7. In the graph paper or Activity Sheet 4.1 taking a 10× 10 grid as a unit, shade with different colours, the parts given below:

(a) 0.4	(b) 2.7	(c) 1.0
(d) 1.42	(e) 0.57	(f) 2.70
(g) 2.05	(h). 0.60	(i) 0.05

Application of decimals to measurement

We can expressing measures that are divided into 10, 100 or 1000 smaller measures in decimals.

Length

As 1 metre = 100 cm or 1 cm = $\frac{1}{100}$ or hundredth of a metre or 0.01

We can write 25 cm as 0.25cm

1 m and 45 cm as 1.45 m

Also 1cm = 10 mm or 1mm = $\frac{1}{10}$ cm = 0.1 cm

We can write 5 mm as 0.5 mm

3 cm and 7 mm as 3.7cm

Money

One rupee is the same as 100 paise. Or 1 paisa = 1/100 or .01 rupees.

The cost of many things involves both rupees and paise. For example, the price of gas is 331 rupees and 65 paise. Recall we had learnt to write it as 331.65 in short form. Since a rupee has 100 paise, now you can see that the dot stands for the decimal point. We can convert rupees and paise to rupees by writing paise after the decimal.

Exercise 4.4

1. Write the following fractions as decimals

   (a) $\frac{7}{10}$ (b) $1\frac{3}{10}$ (c) $\frac{47}{100}$ (d) $\frac{41}{1000}$ (e) $\frac{3}{100}$

   (f) $\frac{46}{1000}$ (g) $\frac{9}{1000}$ (h). $\frac{40}{1000}$ (i) $\frac{2}{5}$ (j) $\frac{1}{2}$

2. Write the following decimals as fractions:

   (a) 0.3 (b) 0.72 (c) 0.05 (d) 4.09

   Write the following decimal numbers in figures

   (a) seven tenths (b) seventeen hundredths

   (c) six hundredths (d) Eight and 5 tenths

4. Write the following decimal numbers in words (as the number of tenths or hundredths

   (a) 0.4 (b) 0.13 (c) 0.05 (d) 0.234

5. Change the following decimals to hundredths

   (a) 0.7 (b) 0.46 (c) 0.3

6. Which is larger

   (a) 0.5 or 0.47 (b) 0.45 or 0.7 (c) 1.78 or 2

7. Which is smaller

   (a) 0.65 or 0.42 (b) 0.67 or 0.8 (c) 0.3 or 1.59

8. Compare these decimals given below by writing > or < or = between them:

   (a) 9 ___8.59 (b) 0.63___0.7 (c) 0.6___0.60

   (d) 0.892___0.85 (e) 0.78___0.8 (f) 0.67___0.6

9. Write the following numbers in ascending order (from smallest to largest):

   (a) 0.34, 0.6, 0.65

   (b) 0.5, 0.78, 0.46

   (c) 1.5, 0.28, 0.7

10. Write the following numbers in descending order (from largest to smallest):

    (a) 0.54, 0.6, 0.47

    (b) 0.3, 0.03, 0.07

    (c) 2.7, 1.78, 0.96, 0.5

11. Write the following measures in centimetres:

    (a) 3 cm and 5 millimetres (b) 6 millimetres

12. Write the following measures in metres
    (a) 2 metres and 34 centimetres   (b) 54 centimetres
    (c) 3 metres and 55 centimetres   (d) 7 metres and 20 centimetres
13. Write the following measures without decimals e.g. 4.5 cm = 4 centimetres and 5 millimetres:
    (a) 3.4 cm   (b) 5.84 m   (c) 4.50 m   (d) 7.2 cm
14. How many paise coins does a rupee have?
15. Convert the following paise to rupees:
    400 paise = _____ rupees
    600 paise = _____ rupees
    125 paise = _____ rupees and ______paise
    470 paise = _____ rupees and ______paise
16. Convert the following rupees to paise:
    5 rupees = _____ paise
    1 rupee and 40 paise = _____ paise
    6 rupees and 60 paise = _____ paise
17. Write the following amounts of money in decimal form:
    (a) 3 rupees and 35 paise
    (b) 7 rupees and 50 paise
    (c) 4 rupees and 5 paise

UNIT 5

Geometry

Making objects by folding their nets

A two dimensional figure that can be cut out and folded in a three dimensional box is called its **net**.

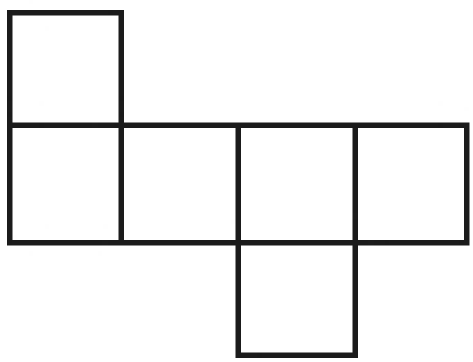
Nets for a cuboid, cylinder and cone are given in Activity sheets 5.1, 5.2 and 5.3 respectively. Fold these to make them and describe them.

Make nets for these of different sizes.

Make a net for a cube. How many edges, faces and vertices does it have?

We can draw its nets on a graph paper that will fold into a cube.

For example, figures given below can be folded into a six face cube.

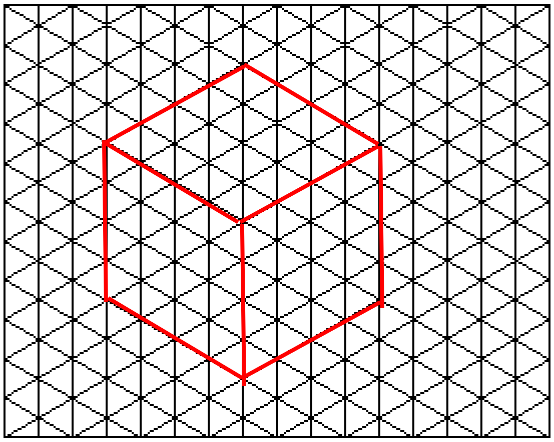


Make more nets, cut and fold them to check whether they will fold into a cube or not.

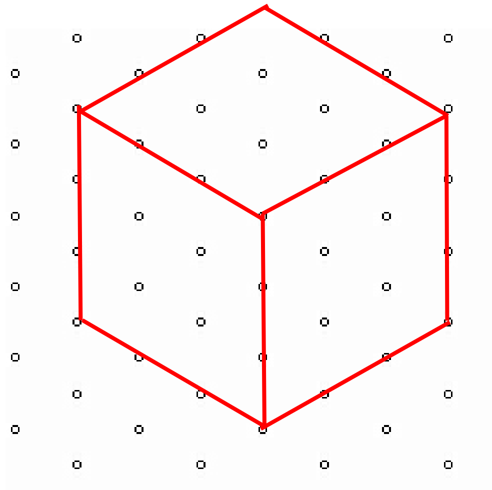
Work in small groups to find out how many different nets (that is that cannot be obtained by flipping or rotating another net) can be made. (Eleven nets are possible.)

Draw 3-D objects in 2-D

We can draw 3-D objects in 2-D by using **a grid or isometric paper** given in Activity Sheet 5.4 and 5.5. The figure given below shows a cube drawn on it.

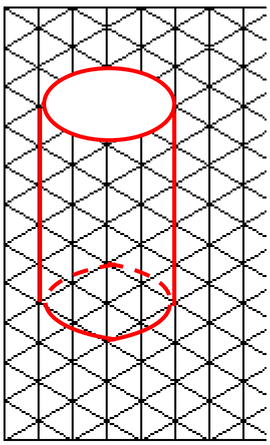


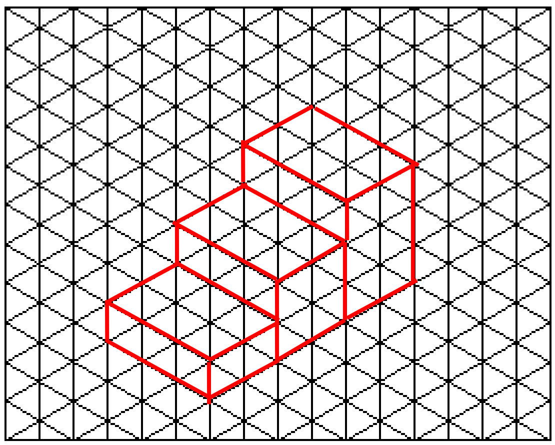
Isometric triangular graph paper



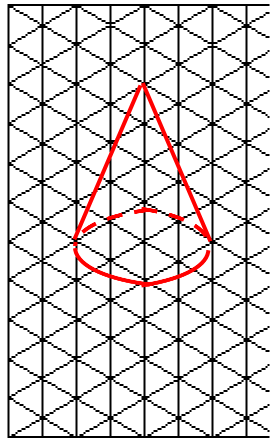
Isometric triangular dot Paper

We can use an isometric grid to draw many different shapes.
Examples of different geometric shapes drawn on isometric grids:
Sometimes we will need to use curved portions, arcs of circles, as in drawing a cylinder.



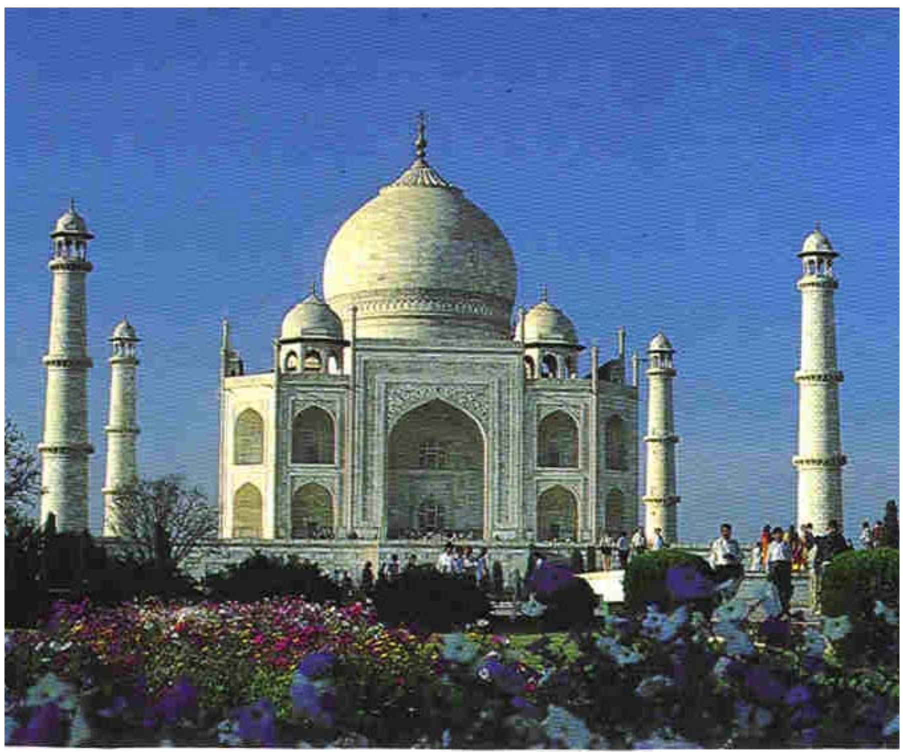


Sometimes in order to draw a particular shape you need to draw lines that don't fall right on the grid, for example when drawing a cone.



Exercise 5.1

1. Draw the following figures on isometric grid or Dot paper given in Activity Sheets 5.4 and 5.5 respectively:
   A cuboid
   A cylinder of larger size
   A stair with four steps
   A cone of smaller size
2. Look at the pictures of some castles given below, then design and create a 3-D drawing of your own castle, using geometric solids. You should have at least one each of the four solids we have studied: cube, cuboid, cylinder, and cone.



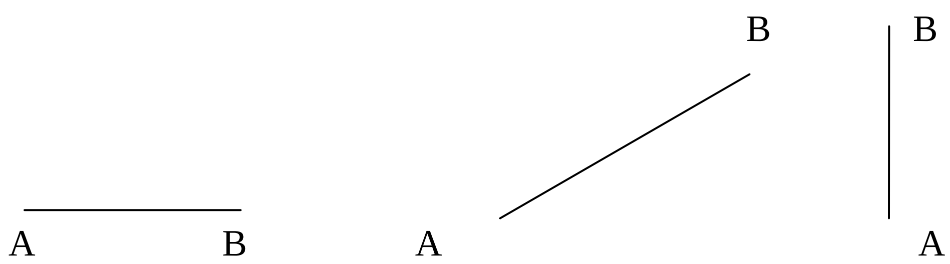
Basic geometrical concepts

Plane

A plane is a flat surface that extends infinitely in all directions. A tabletop, a blackboard, a wall, a paper are all parts of a plane.

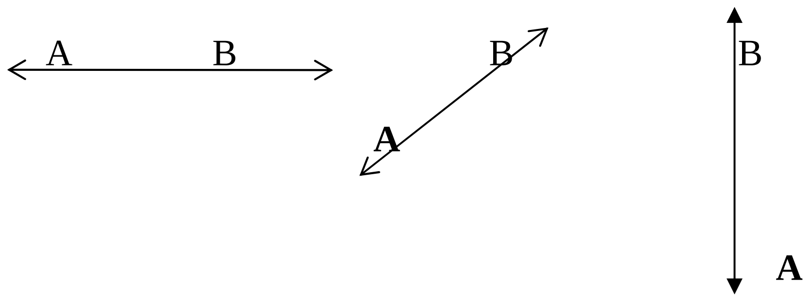
Point - A point is a fixed spot on a plane e.g. a corner of a chip, a corner of a triangle. We represent a point by a dot on a paper (**.**) and label it by any letter of the alphabet.

Line segment- you see many models of line segments in your environment e.g. a string held tight by two children, an edge of a chip, an edge of a rectangular box, a side of a triangle. A line segment is a straight line with two endpoints. We label a line segment by two letters at the beginning and end of the segment AB or BA

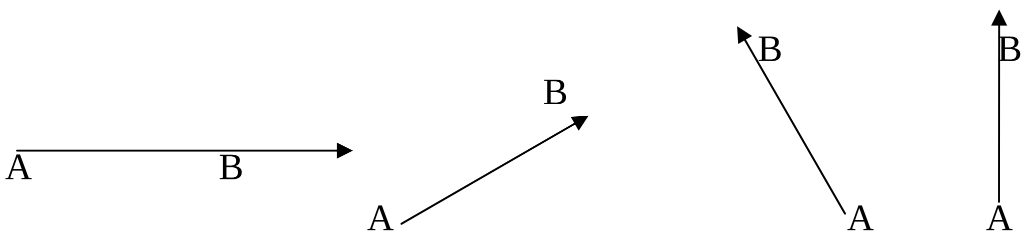


Line-

A line is a straight line that extends infinitely in both directions. We draw arrows at the end to indicate that it extends infinitely in both directions (that is goes on and on endlessly). We label a line by any two points below/above the line with arrows in both directions.

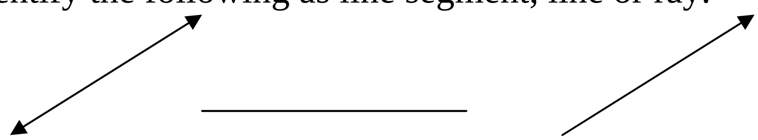


Ray – A ray is a line starting at a point and going on infinitely in one direction. We draw an arrow at the one end to indicate that it extends infinitely at that end. We label a ray by the initial point letter first and then a second point on the line ending in an arrow.



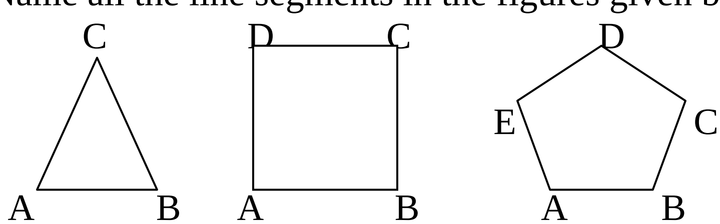
Exercise 5.2

1. Give examples that come close to the concept of a plane in our environment.
2. Give examples of models that come close to the concept of a point in our environment.
3. Give examples of models that come close to the concept of a line in our environment.
4. Use a string to mark 8 points on the floor of your classroom that are exactly at the same distance from a corner of the classroom.
5. Identify the following as line segment, line or ray.



(a) (b) (c)

6. Draw and label
   (a) 3 line segments
   (b) 3 rays
   (c) 3 lines
7. Name models of line segments that you find in your environment.
8. Name all the line segments in the figures given below:

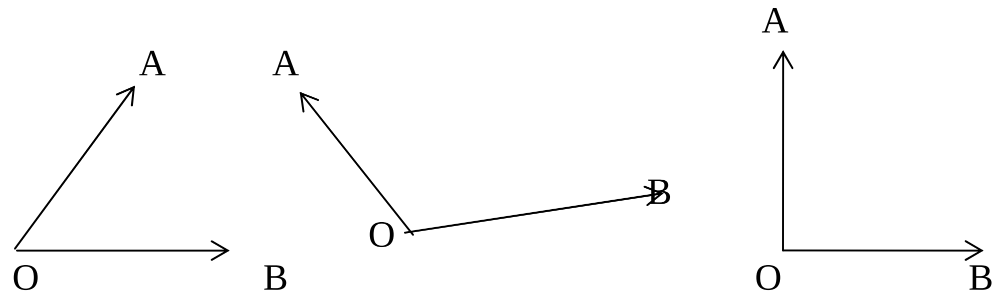


(a) (b) (c)

9. How do a line segment and a line differ?
10. How do a ray and a line differ?
11. How do a ray and a line segment differ?
12. Can you plant 9 trees so that there are 8 straight lines with 3 trees in each line. If yes, show their location by points.

Angle

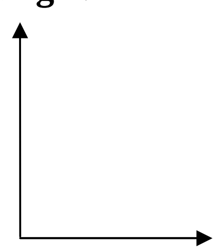
Ask students to bring two thin sticks, tooth picks or thin wires about 10 cm long. Ask students to put one of the sticks on the paper and take a second stick and join it to the first at one endpoint. As you rotate one of the sides keeping it joined to the other stick you get different angles. We can think of the two sticks as representing two rays having the same initial point. **The two rays with the same initial point form an angle**. The rays are the **sides** of the angle. The common endpoint is the **vertex** of the angle.
We can represent it on the paper as follows:



We write it as $\angle AOB$ with the initial point in the middle. We read it as angle AOB. We can also name it by its vertex O

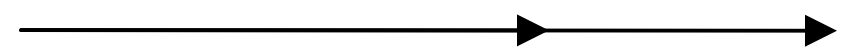
Types of angles

1. Keep one stick horizontally; keep the other stick vertically at the left endpoint. The stick put horizontally represents a ray going indefinitely to the right while the stick joined to it vertically represents a ray going upward indefinitely. The angle formed by these rays is called a **right angle**.

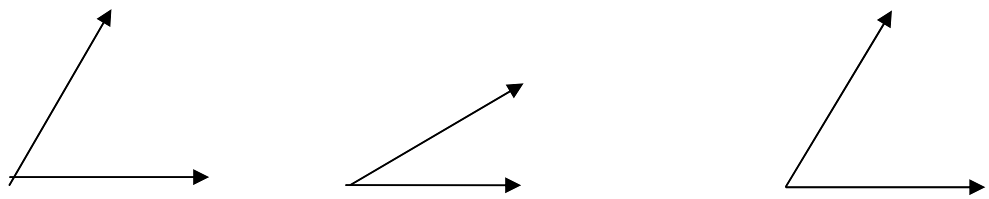
   You can see many right angles in your environment e.g. corners of a paper, the angle that hands of a clock make at 3 o'clock, angles of a square.
2. Let the horizontal stick remain in the same position. Now rotate the other stick clockwise until it coincides with the horizontal stick. The measure

of the angle between two coincident rays is regarded as zero.

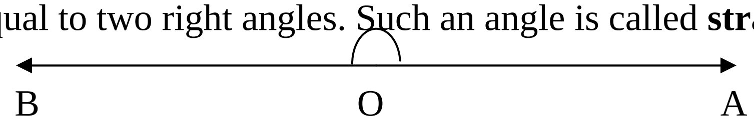


You can see many angles that have zero measure in your environment e.g. the angle that minute hand and hour hand make at 12 o'clock.

3. Let the horizontal stick remain in the same position. Now rotate the other stick anticlockwise. Before it attains the vertical position angles are formed whose measure is greater than zero and less than a right angle. Such an angle is called **acute angle**.

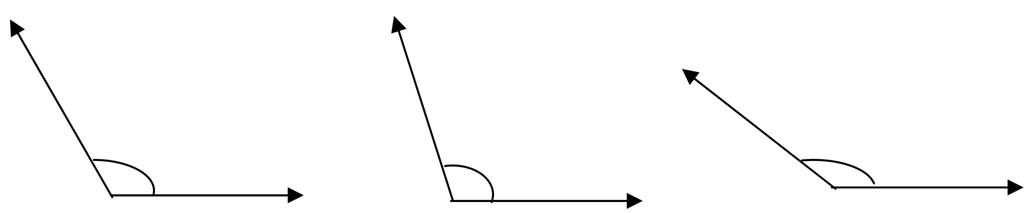


4. With the horizontal stick in the same position, rotate the second stick anticlockwise to the left until it is in the horizontal position with the common initial point O in the middle. The measure of angle BOA is equal to two right angles. Such an angle is called **straight angle**.



You can see many angles that has a measure of two right angles in your environment e.g. the angle that minute hand and hour hand make at 6 o'clock

5. With the horizontal stick in the same position, rotate the second stick to the left passing through the vertical position. Another angle is formed whose measure is greater than a right angle and less than a straight angle or two right angles. Such an angle is called **obtuse angle**.

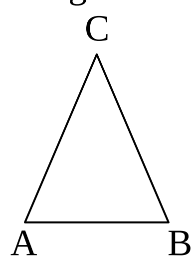


You can identify whether an angle is right, acute or obtuse by comparing it with a model of a right angle. You can make a model of a right angle by folding a rectangular or square paper by folding a paper lengthwise and then

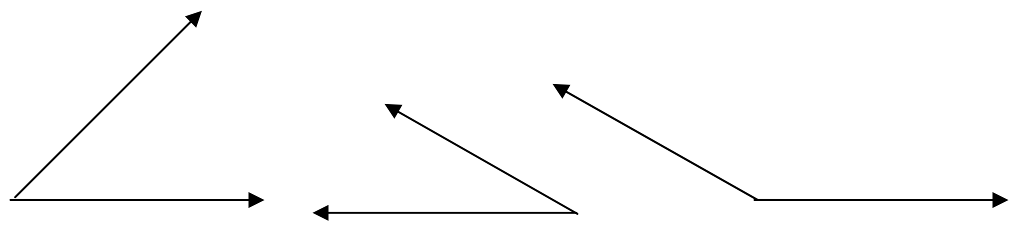
breadth wise. The folded corner provides a convenient model. If the corner fits the angle, it is a right angle. If the angle is greater than the right angle, it is an obtuse angle. If the angle is smaller than the right angle, it is an acute angle

Exercise 5.3

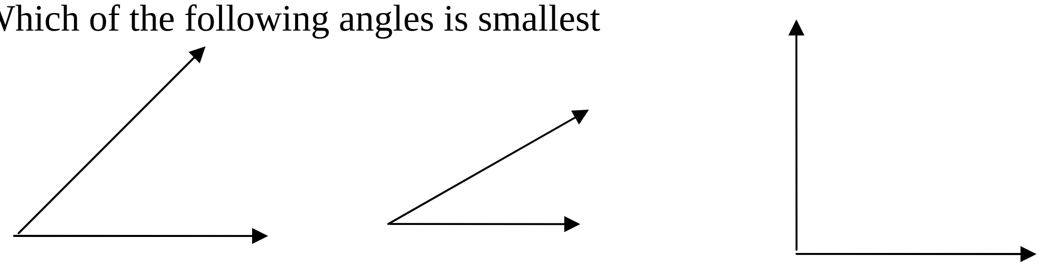
1. Draw an angle and label it.
2. Give 3 examples of angles in the environment.
3. Name all the angles of the figures given below:



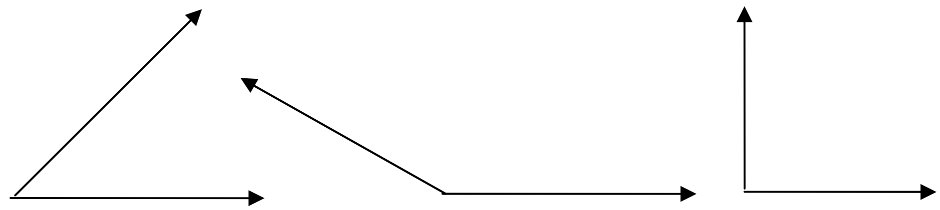
4. Which of the following angles is largest?



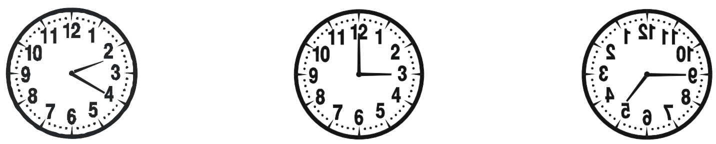
5. Which of the following angles is smallest



6. Give 3 examples of right angles in the environment.
7. Make the following type of angles with two thin sticks, wires or tooth picks:
   (a) an acute angle (b) a right angle (c) an obtuse angle
   (d) a straight angle
8. Make a model of the right angle with paper or use the right-angled corner of a setsquare in your geometry box to classify the following angles as right, acute or obtuse.

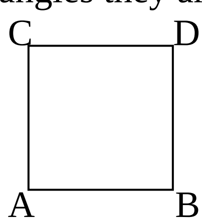


9. Classify the angles made by the minute hand and hour hand in the following clocks as acute, obtuse or right angles:

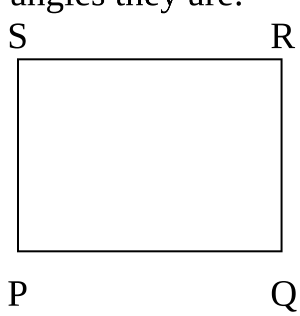


(a) (b) (c)

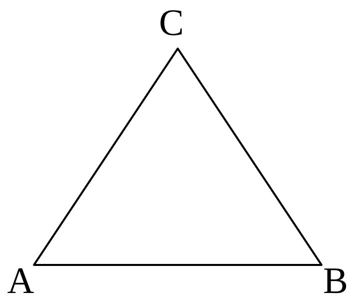
10. What is the angle between east and north directions
11. What is the angle between east and west directions?
12. What angle do the minute hand and hour hand make at the following times
    (a) 3 o’clock (b) 6 o’clock (c) 12 o’clock
13. Name all the angles of the square given below and state what kind of angles they are:



14. Name all the angles of the rectangle given below and state what kind of angles they are:

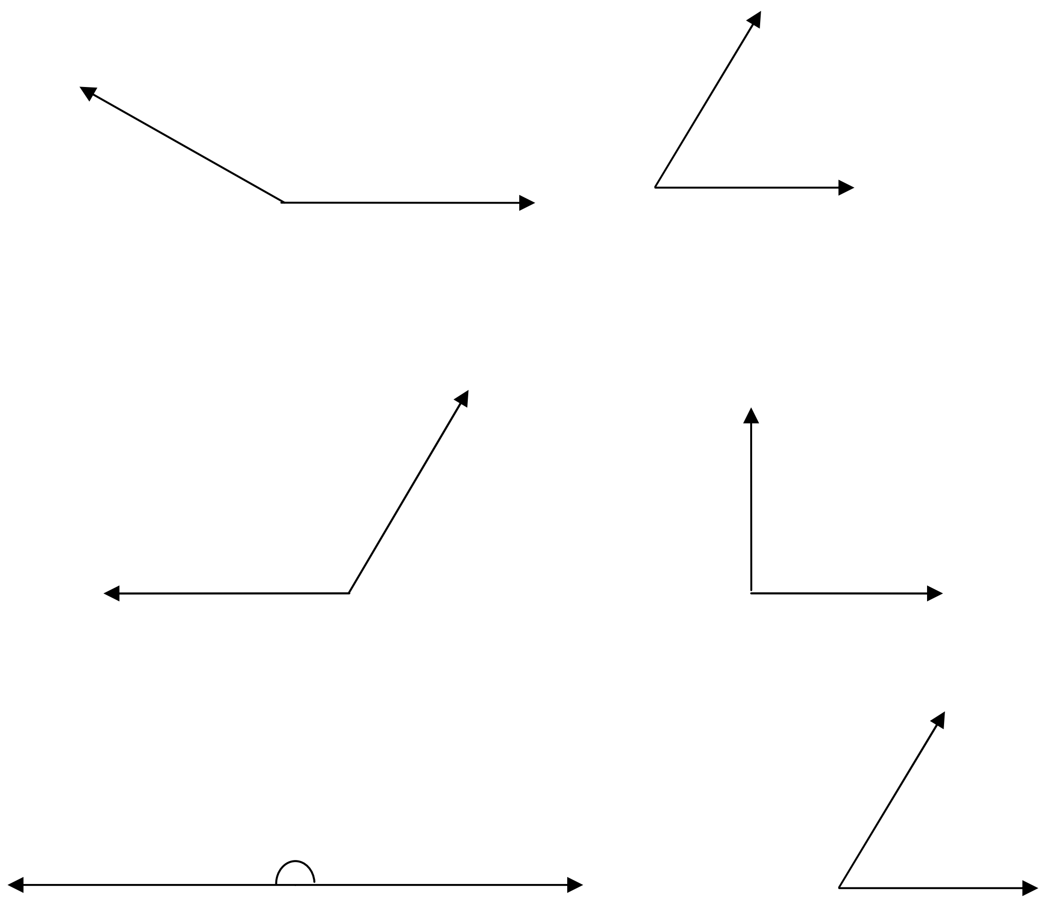


15. Name all the angles of the triangle given below and state what kind of angles they are:



16. Draw the following type of angles:
    (a) an acute angle (b) an obtuse angle (c) a right angle
    (d) a straight angle

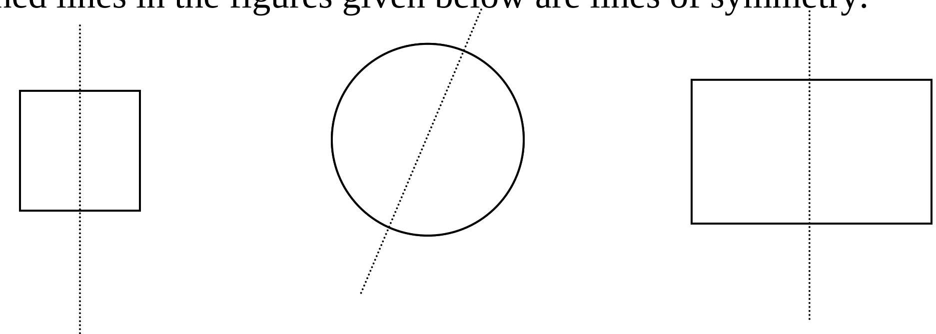
17. Identify the angles given below as acute, obtuse, straight or right angle



Symmetry

Reflection or line Symmetry

If a picture can be folded along a line so that the two parts cover each other exactly, then the picture is said to be symmetrical and the line is called the line of symmetry.
We can make symmetrical drawings with crease as a line of symmetry by folding a paper and drawing a figure along the fold and cutting it, when you unfold it you will get a symmetrical object with the fold as line of symmetry.
We can also find if geometrical figures have lines of symmetry by checking if we can fold it so that the two halves cover each other exactly.
The dashed lines in the figures given below are lines of symmetry.

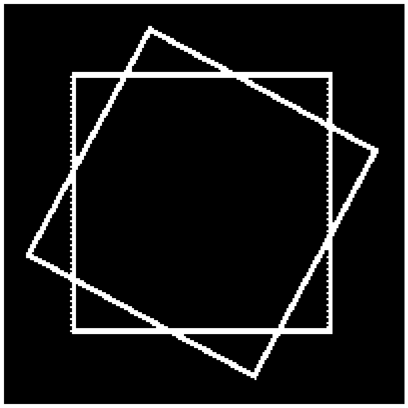


Rotational symmetry

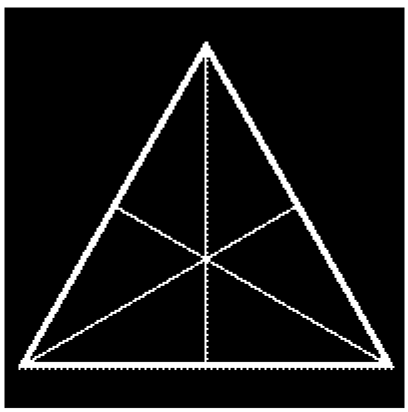
We have rotational symmetry if we can turn a shape around a point (centre of symmetry) into one or more different positions during one complete turn that look exactly the same.

Activity 5.1

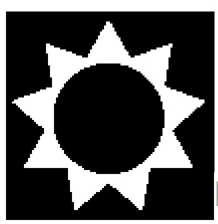
Find the centre of the square by drawing lines that joining the opposite corners, where they meet is the centre of the square.
Trace the square given below; copy its outline on a tracing paper. Now you have two identical squares. Keep the tracing paper on the original square so that it fits it exactly. Hold a pin in the centre with one hand and turn the tracing paper slowly and count the number of positions in a complete turn, where it fits again. What was your count? (4), this count is called the **order of rotational symmetry.**



Now try to do the same with the equilateral triangle given below. The point where the lines joining the midpoint of sides to the opposite vertex meet is the centre of the triangle. What is the order of rotational symmetry? (3)

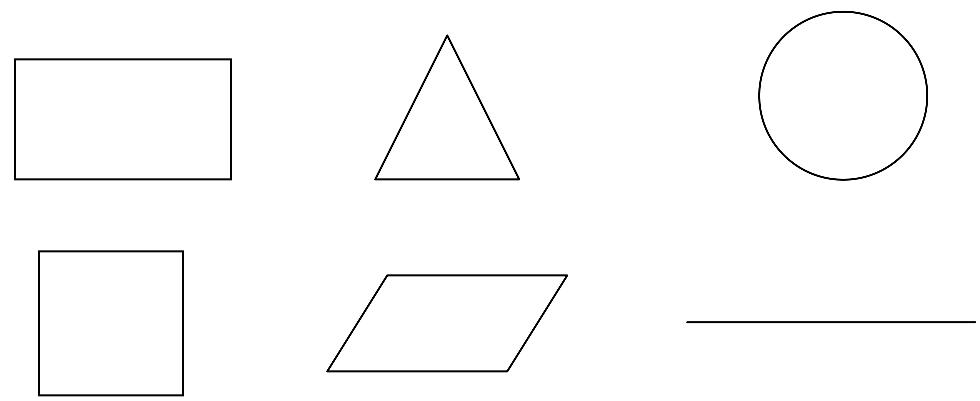


Now try to do the same with the star given below using the centre of the circle (how will you find it?). What is the order of rotational symmetry?

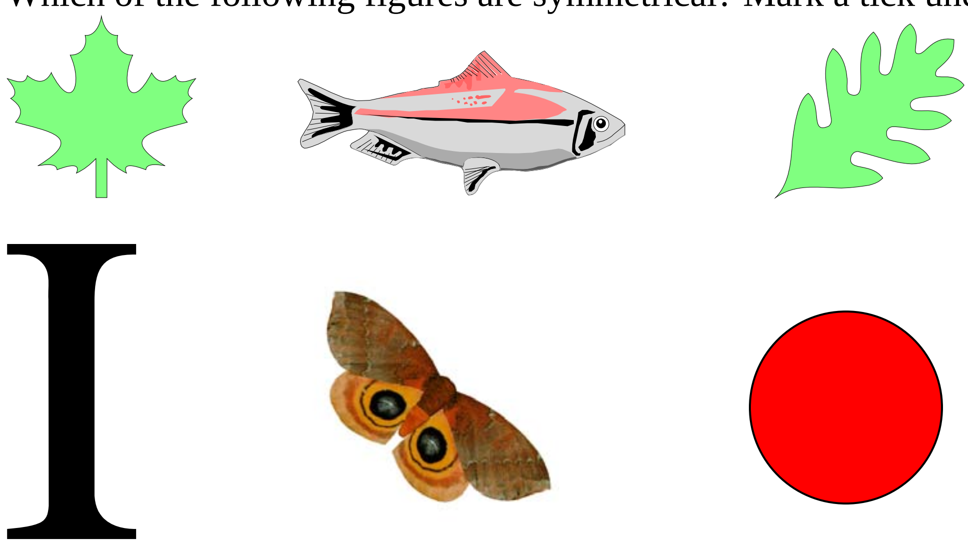


Exercise 5.4

1. Draw a square, a rectangle, a triangle and a line on a dot paper and draw all lines of symmetry in them.
2. Complete figures on the dot paper given in Activity Sheet 5.3 so that the dashed line is the line of symmetry.
3. Trace and cut the pictures given below and find all lines of symmetry by folding these.

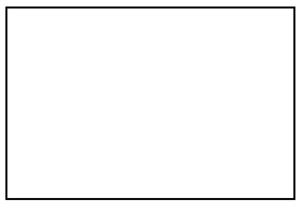
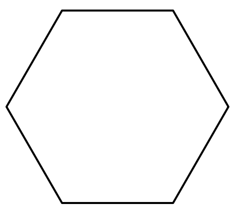
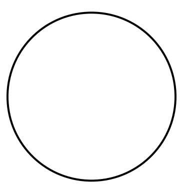
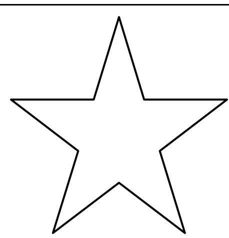
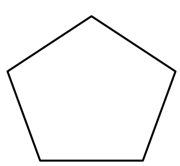


4. Which of the following figures are symmetrical? Mark a tick under it.

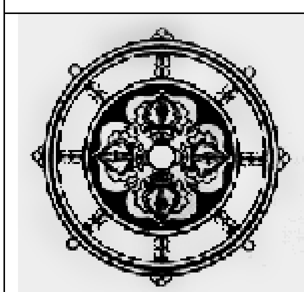


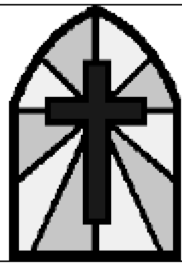
5. Find some pictures of objects that are symmetrical, paste them in your notebook, and draw lines of symmetry in those.
6. Make some symmetrical shapes by folding a piece of paper into two halves, drawing shapes and cutting them out. Paste these in your notebook.

7. Fill in the following table for line symmetry and rotational symmetry of the shapes given below:

Shape	Number of lines of symmetry	Order of rotational symmetry
	2	0
		
		
		
		

8. For the letters or designs given below, fill in the following table for line symmetry and rotational symmetry of the letters given below

Letter or symbol	Number of lines of symmetry	Order of rotational symmetry
Z	0	2
S		
H		
E		
N		
		
		

9. Make a collection of designs and trade marks that have rotational symmetry.

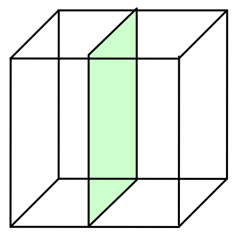
Symmetry in 3-D shapes

As 2-D figures have **lines** of reflectional symmetry. 3-D shapes have **planes** of reflectional symmetry. A plane is a plane of reflectional symmetry if it can slices the shape into two congruent solids.

A hot-wire cutter can be used to cut a Styrofoam model into two such solids.

The path the hot wire follows describes the plane of reflectional symmetry.

The cube below has its intersection with the plane of symmetry shaded.



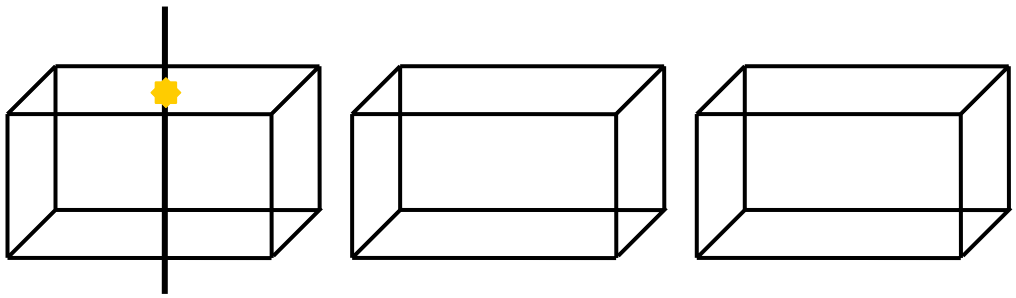
Activity 5.2

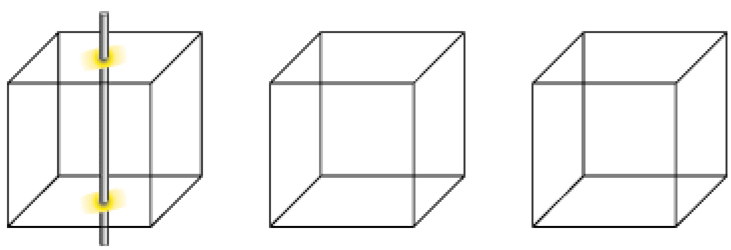
Draw 2 cubes and shade the other two planes of reflectional symmetry that bisect four parallel edges. How many planes of reflectional symmetry are there?

How many planes of reflectional symmetry do the cuboid, cylinder and cone have? Verify by cutting Styrofoam models of these.

Draw a cuboid, cylinder and cone and draw and shade planes of reflectional symmetry in them.

Rotational symmetry for plane figures is described by the *order* of rotational symmetry about a **point**, whereas rotational symmetry is described by the **order** of rotational symmetry about a **line called axis of symmetry**. Place your fingers in the center of a pair of opposite faces of a cuboid and imagine it is the end point of an axis of rotation. Rotate 180° and notice that the cuboid has the same orientation. Repeat this once more to return to the original location. This shows that the cuboid has axes of rotational symmetry of order 2. This axis is drawn on the first cuboid below. Mark the intersection points and draw axes for the remaining cuboids.





Activity 5.3
What is the order of axes of rotational symmetry of a cylinder and a cone? Draw these and show an axis of rotational symmetry in these.

UNIT 6

Money Transactions

There are many transactions involving money. We pay money for buying things, bus fare, school fees etc. and get money for providing services, conducting business where the shopkeeper buys things at cheaper rates and then sells to others at a higher price to make a profit.
Money is available in denomination of one, two, five, ten, twenty, fifty, hundred, five hundred and thousand rupees. Rupees 1, 2 and 5 are available in coins also. We also have coins of smaller denomination in **paise**. One rupee is the same as 100 paise or 1 paisa = 1/100 or .01 rupees.
The cost of many things involves both rupees and paise. For example, the price of gas is 331 rupees and 65 paise. Recall we had learnt to write it as 331.65 in short form. Since a rupee has 100 paise, now you can see that the dot stands for the decimal point. We can convert rupees and paise to rupees by writing paise after the decimal. We can then add and subtract money and multiply or divide by a number as in decimals.
Ask the students to give situations of transactions that would require addition and subtraction of money and multiplication and division of money by a number. In this unit, we will discuss some more transactions that require addition and subtraction of money and division and multiplication of rupees by a number.

Rounding off to nearest rupee

The 50-paise coins are also on their way out, we would soon have to round off the money to the nearest rupee. If the paise are less than 50 paise, we pay only the rupees part, if paise are more than or equal to 50 paise, we pay one rupee more for the paise.
For example if the prices of different things are as follows, we pay the amount shown against them:

Rs 16.80 → Rs 17
Rs 27.25 → Rs 27
Rs 312.75 → Rs 313
Rs 240.50 → Rs 241

Unitary Method

If we are given cost of one object, we can find the cost of a number of many such objects, say 5 by multiplying the cost of 1 object by 5.
Alternatively, if we are given cost of a number of objects, say 12 we can find the cost of one object by dividing that cost by 12.

In unitary method, we are given the cost of a number of objects and we want to find the cost of a different number of objects.

In such situations, we first find the cost of one object by dividing the cost of a number of objects by the number and then find the cost of a different number of objects by multiplying by that number.

Example 1

The cost of eggs is Rs. 20 a dozen (1 dozen = 12), how much would a person have to pay if he buys 6 eggs.

Cost of 12 eggs = Rs. 20

Cost of 1 egg = Rs. $\frac{20}{12}$

Cost of 6 eggs = Rs. $\frac{20}{12} \times 6 = \frac{120}{12} = 10$

Example 2

The cost of a roll of 20 metres of water pipe is Rs.190. if Sunil bought 8 metres of water pipe, how much money he would have to pay?

Cost of 20 metres of pipe is Rs. 190

Cost of 1 metres of pipe = $Rs. \frac{190}{20}$

Cost of 8 metres of pipe = $Rs. \frac{190}{20} \times 8 = \frac{1520}{20}$ = Rs.74.00

Exercise 6.1

1. Convert the following paise to rupees:
   400 paise = _____ rupees
   600 paise = _____ rupees
   125 paise = _____ rupees and ______paise
   470 paise = _____ rupees and ______paise
2. Convert the following rupees to paise:
   5 rupees = _____ paise
   1 rupee and 40 paise = _____ paise
   6 rupees and 60 paise = _____ paise
3. Write the following amounts of money in decimal form:
   (a) 3 rupees and 35 paise
   (b) 7 rupees and 50 paise
   (c) 4 rupees and 5 paise
4. Round off the following to the nearest rupee:
   46 rupees and 25 paise
   18 rupees and 72 paise
   104 rupees and 50 paise
5. If oranges are Rs 30 a dozen (1 dozen = 12), what will be the cost of
   (a) 1 orange
   (b) 8 oranges
6. The price of tomatoes is Rs 16 per kg, what would be the cost of
   (a) 5 kg of tomatoes?
   (b) $\frac{1}{2}$ kg of tomatoes?
   (c) $\frac{1}{4}$ kg of tomatoes?
7. A bottle of 100 ml of a tonic costs Rs 40.
   (a) What would be the cost of 200 ml of the same tonic?
   (b) If a bottle of 200 ml of tonic costs Rs 75, how much do you save by buying the 200 ml bottle of tonic?

Profit and Loss

We buy things daily from the market. The shopkeeper buys those from the wholesale market at a cheaper price. He sells those at a higher price to make some money. For example, if he buys apples at Rs. 20 per kg and sells those at Rs. 25 per kg, he earns a profit of Rs.5 per kg.
The price at which he buys a thing is called its **cost price (C.P.)**.
The price at which he sells a thing is called its **selling price (S.P.)**
If S.P. > C.P. then he earns a **profit = S.P. – C.P**.
If S.P. < C.P. then he incurs a **loss = C.P – S.P**.
S.P. and C.P. of same number of items must be used to find profit or loss.

Example 1

A shopkeeper bought notebooks at Rs.100 per dozen and sold them at Rs. 10 each.

(a) What is the cost price of a dozen notebooks?
(b) What is the selling price of a dozen notebooks?
(c) Would the shopkeeper earn a profit or incur a loss.
(d) How much is his profit or loss per dozen notebooks?

The cost price of a dozen notebooks = Rs 100
The selling price of a dozen notebooks =Rs 12×10 = Rs.120
As. S.P. > C.P, he earned a profit.
Profit for a dozen notebooks = S.P. – C.P. = Rs.120 – Rs.100 = Rs.20.

Example 2

A fruit seller bought 10 dozen bananas at Rs. 12 per dozen. He sold 9 dozens of these at Rs 14 per dozen, the left over bananas became soft and he had to sell them at Rs. 8 per dozen. How much profit or loss did he incur in all?
The cost price of bananas = Rs.10×12 = Rs. 120
The selling price of bananas = Rs 9×14 + Rs 1×8 = Rs.126 + Rs.8 = Rs. 134
As. S.P. > C.P, he earned a profit.
Profit = S.P. – C.P. = Rs.134 – Rs.120 = Rs.14.

Example 3

Suneel bought a Refrigerator for Rs.14,500, after a year he was transferred to another city; he sold the Refrigerator for Rs. 9, 000. Did he earn a profit or loss and how much was it?
The cost price of Refrigerator = Rs.14, 500
The selling price of Refrigerator = Rs.9, 000
As S.P. < C.P., Suneel incurred a loss on the Refrigerator.
Loss = C.P. – S.P. = 14, 500 – 9, 000 = Rs. 5, 500.

Exercise 6.2

1. A milk dairy buys milk from milkmen at the rate of Rs.13.50 per litre and sells at Rs. 15 per litre.
   (a) What is the cost price of milk?
   (b) What is the selling price of milk?
   (c) Will the dairy make a profit or incur a loss?
   (d) How much gain or loss would he incur per litre of milk?
   (e) If it sells 500 litres per day, how much gain or loss would it incur?
2. Ram bought a watch for Rs.500. He sold it after a year for Rs. 350. How much gain or loss did he incur?
3. We know that Profit = S.P. – C.P. if you are given S.P. and profit, how would you find the C.P.?
4. If you were given C.P. and profit, how would you find the S.P.?
5. We know that Loss = C.P. – S.P. if you were given C.P. and Loss, how would you find the S.P.?
6. If you were given S.P. and Loss, how would you find the C.P.?
7. In the table given below, two of C.P., S.P and profit are given fill in the third one.

Cost Price.	Selling Price.	Profit
Rs 5.50	Rs.6	
Rs. 15		Rs.1.20
Rs.	Rs. 3000	Rs.350

8. In the table given below, two of C.P., S.P and Loss are given fill in the third one.

Cost Price.	Selling Price.	Loss
Rs 100	Rs.90	
Rs. 1500		Rs.120
Rs.	Rs. 1500	Rs.350

9. A vegetable vender bought 30 kg onions for Rs.360, if he wants to make a profit of Rs.60 on these, what selling price per kg he should fix for onions.
10. A man sold a car for Rs 1,80,000 and incurred a loss of Rs 35,000. What was the cost price of the car?
11. How does a shopkeeper use mathematics in his daily work?
12. Present a report in class on how do you use mathematics in your daily life.

Estimation

Estimation is concerned with quick association of results for computation. It is important in daily life to know how much money to take when you go shopping for certain things, quickly check your bill, how much tips to pay in a restaurant for a certain bill.

Asking students questions as the ones given below and asking those that replied quickly how did they do it will facilitate development of strategies for estimation:

1. A notebook costs Rs 5.50. Can you buy 4 of these if you have Rs 20? How did you decide?
2. You bought some fruits and vegetables from mother dairy whose prices came to Rs.15.25, Rs.14.30, Rs.31.75 and Rs.50.25. the salesman at the counter gave a bill for Rs.111.55. is the amount asked reasonable? How did you decide?
3. You are expected to give about 8 % tip in a restaurant. If your bill came to Rs 73, about how much tip you should pay?
4. You pay your maid Rs. 300 per month. If in a month she worked for 20 days, about how much should you pay her?
5. Eggs are Rs. 16 a dozen, if you have Rs. 10, do you have enough money to buy 8 eggs?

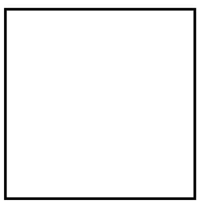
UNIT 7

Measurement

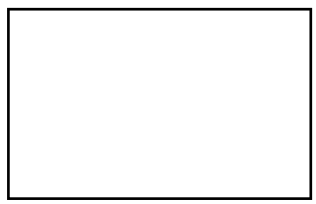
Perimeter

Distance around a figure or shape is called its perimeter. We often need to find it in daily life e.g. if we want to stitch a lace around a table cloth, how much lace to buy.

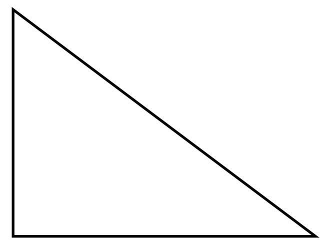
If the figure is a polygon, that is a closed figure made up of line segments it can be found by measuring all its sides and adding those. Verify the perimeter of the following figures is as given below them:



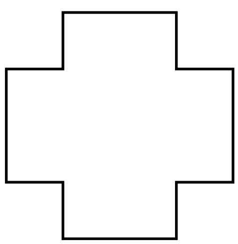
(10 cm)



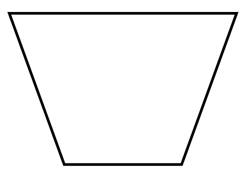
(13 cm)



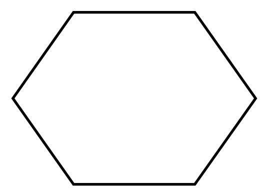
(12 cm)



(16 cm)



(11.8 cm)



(12 cm)

We can also use properties of figures to find their perimeter.

For example, we know all the sides of a square are equal; we can measure length of one of its sides and multiply it by 4 to find its perimeter p. Such a rule is called a **formula**.

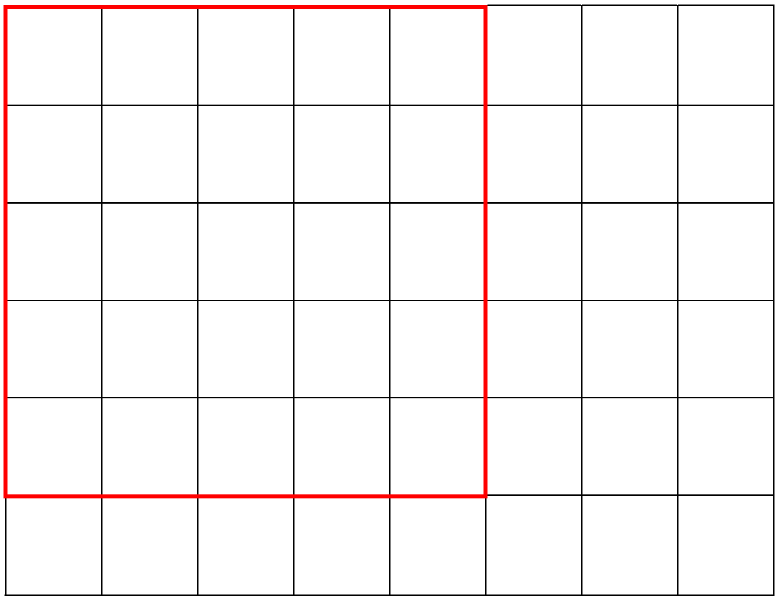
Formula for finding perimeter of a square is p = 4 s.

Similarly we know that opposite sides of a rectangle are equal; we can measure its length l and breadth b only, add the two and double the sum to find its perimeter p.

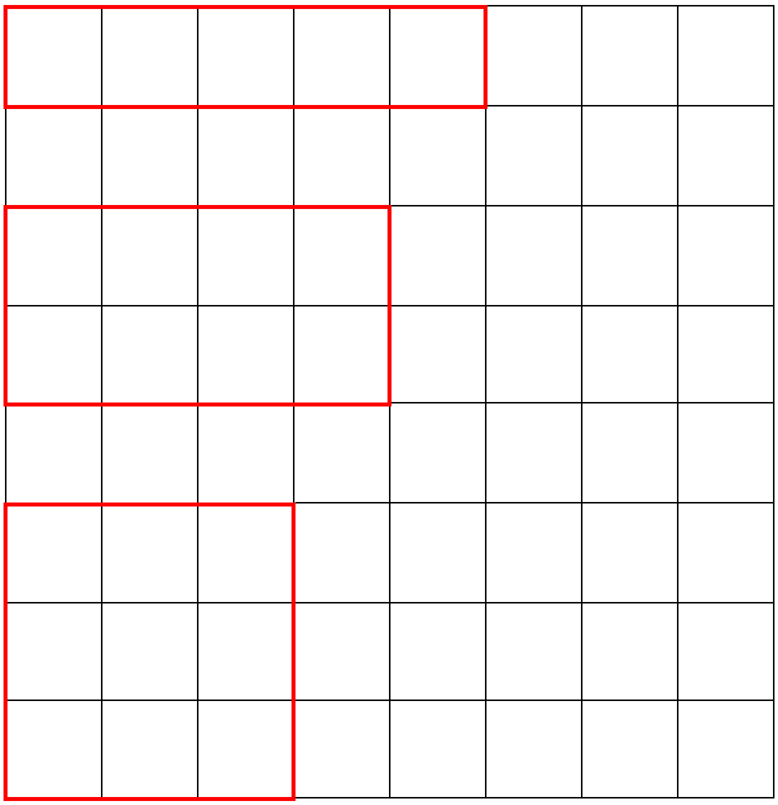
Formula for finding the perimeter of a rectangle is p = 2 (l + b)

We can also draw figures with a given perimeter on a graph paper by using these properties. For example, to draw a square whose perimeter is 20 units, we can find its side by dividing 20 by 4 and then draw it. The square given

below is drawn with its side equal to 5 units where length of a small square is 1 unit.

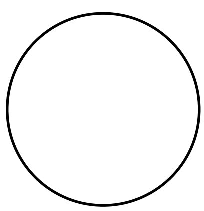


Similarly to draw a rectangle whose perimeter is 12 units, we divide 12 by 2 to find the sum of its length and breadth then any rectangle whose length and breadth has a sum of 6 e.g. 3, 3; 4, 2; 5, 1 would have a perimeter of 12. All the rectangles with red borders have a perimeter of 12 units.

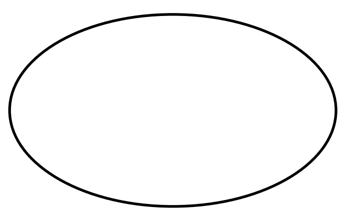


Perimeter of curved and irregular shapes

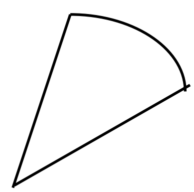
If the shape is curved or irregular e.g. the shapes given below:



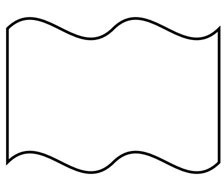
(1)



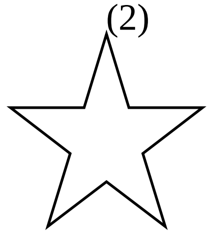
(2)



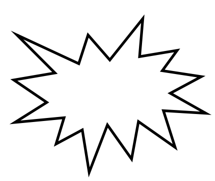
(3)



(4)



(5)



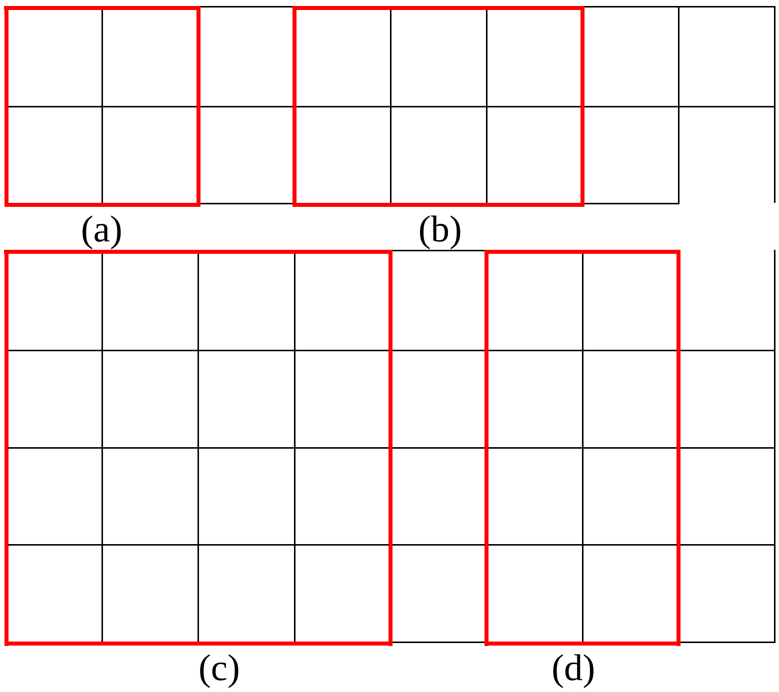
(6)

We cannot measure it by a ruler. However, we can mark a point on it and keep an end of a thin string or wool there, take it around the figure keeping it on the line until we come back to the same point. Cut the string or wool and

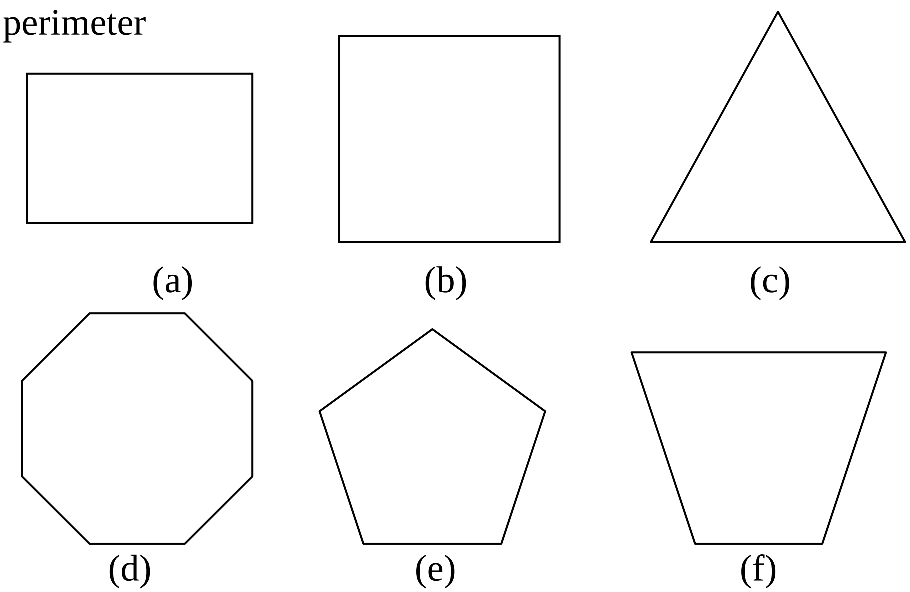
measure the length of the string. That gives the parameter of the figure. (Demonstrate it).

Exercise 7.1

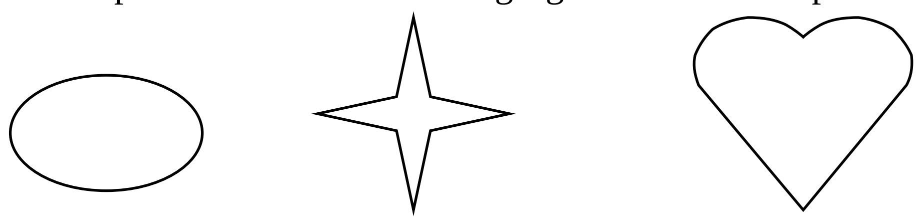
1. Give situations in daily life where you need to find perimeter.
2. Find the perimeter of the figures with red borders given below taking the length of small square as a unit:



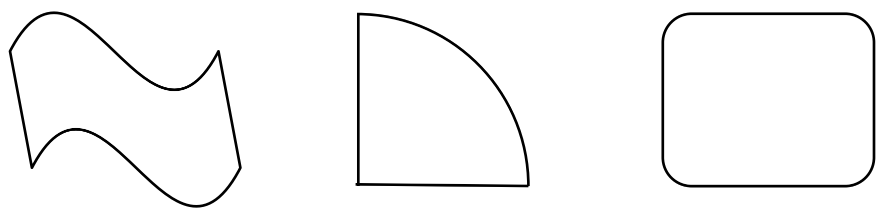
a) Measure the length of sides of the figure given below and find their perimeter



3. Mark the following figures on a graph taking the length of small square as a unit and find their perimeter:
   (a) A square whose side is 3 units.
   (b) A rectangle whose length is 5 units and breadth is 3 units.
4. Draw the following figures on the graph paper taking the length of small square as unit so that they have the given perimeter:
   (a) A square whose perimeter is 12 units.
   (b) A square whose perimeter is 16 units.
   (c) A rectangle whose perimeter is 10 units.
   (d) A rectangle whose perimeter is 14 units.
5. Find the parameter of the following figures with the help of a string:



(a) (b) (c)



(d) (e) (f)

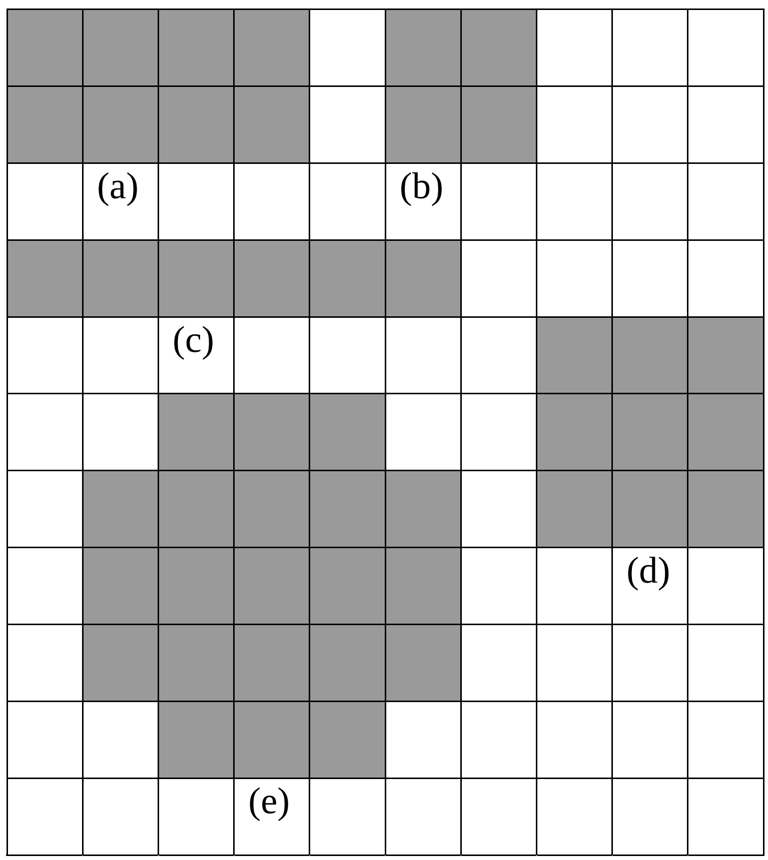
6. Anurag ran around a rectangular field whose length is 150 metres and breadth is 100 metres. How much distance did he run in
   (a) 1 round (b) 4 rounds
7. The side of a square baby sheet is 1.25 metres. You want to fix a lace around it, how much lace should you buy.

Area

Ask questions such as the following which wall would require more paint this or that. Can I cover the entire table with this paper? Can I write more on this paper or that? Comparisons such as these will give an intuitive feeling of the area and comparison of areas.

The amount of surface is called area.

We often need to find the amount of surface e.g. to find out how much sun mica to buy to cover a tabletop. We can measure the amount of surfaces by covering the surface by a graph paper in which the area of a square is 1 unit and count the number of squares.

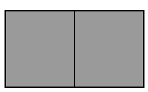
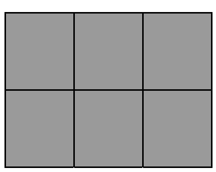
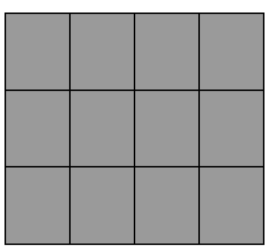


The perimeters and areas of different shaded figures by counting squares are given in the following table

Figure	Perimeter	Area
(a)	12 units	8 units
(b)	8 units	4 units
(c)	14 units	8 units
(d)	12 units	9 units

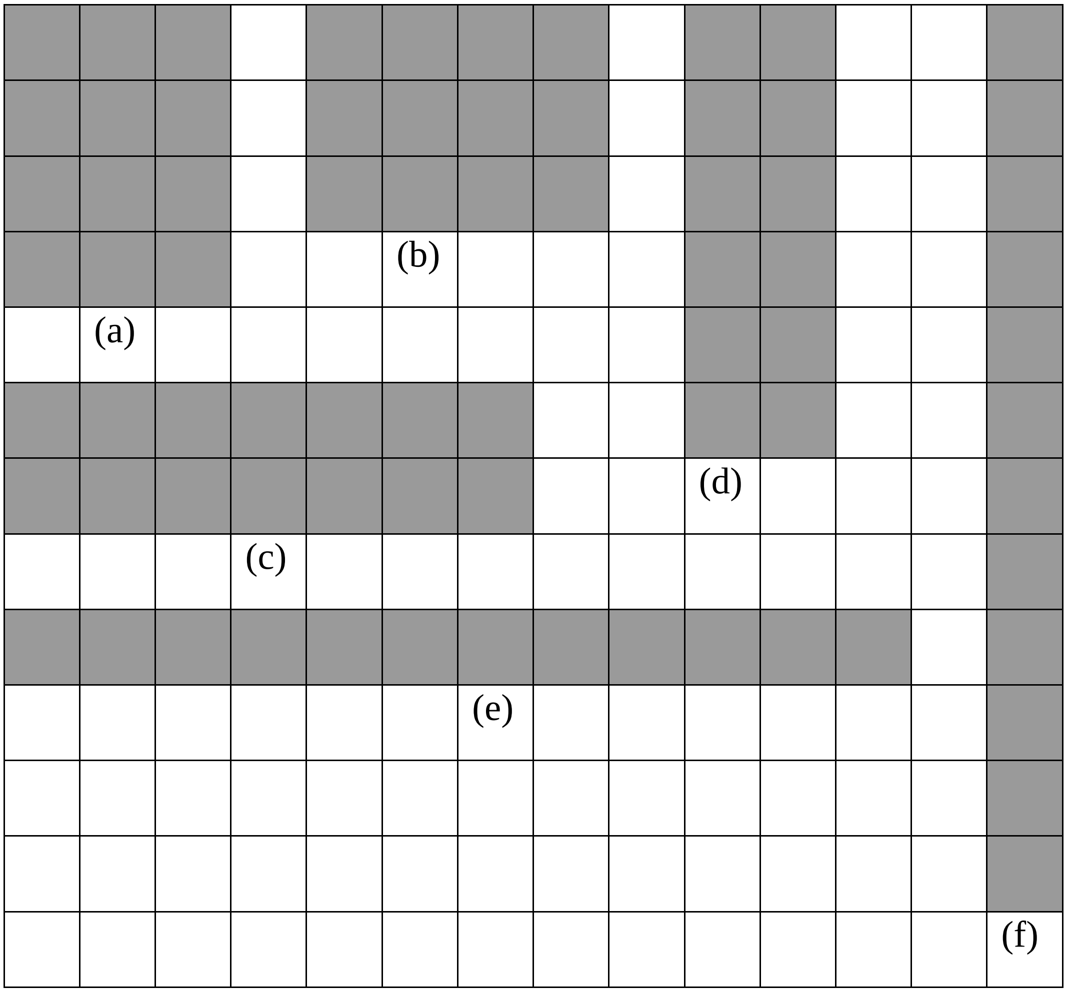
(e)	20 units	21 units

The area and perimeter would depend on the size of grid.
We again need a standard unit to measure the amount of surface. We use the surface covered by a square whose side is 1mm/1cm/1m. The unit is called 1 square millimetre, or $1mm^2$ or 1 square centimetre or $1cm^2$ or 1 square metre or $1m^2$.
We can again find rules or formulae to find the area of regular figures.
Verify the entries in the table given below

Rectangle	Length in centimetre	Breadth in centimetre	Area in square centimetres
	2	1	$2 \times 1 = 2$ cm^2
	3	2	$3 \times 2 = 4$ cm^2
	4	3	$4 \times 3 = 12$ cm^2

Thus, the **formula for finding area of a rectangle is= l × b, where l is the length and b is the breadth of sides of a rectangle.** Note that if length and breadth are in centimetres, the area is in square centimetre.
As length and breadth of a square are equal, the **formula for area of a square is = s × s where s is the length of side of a square.**
Drawing rectangles whose area and perimeter are given
We will illustrate it with an example. Draw a rectangle whose area is 12 square centimetre and whose perimeter is 14.

Given an area say 12 square centimetres, we can draw many rectangles that would have the same area. All the rectangles given below have an area of 12 square centimetres.

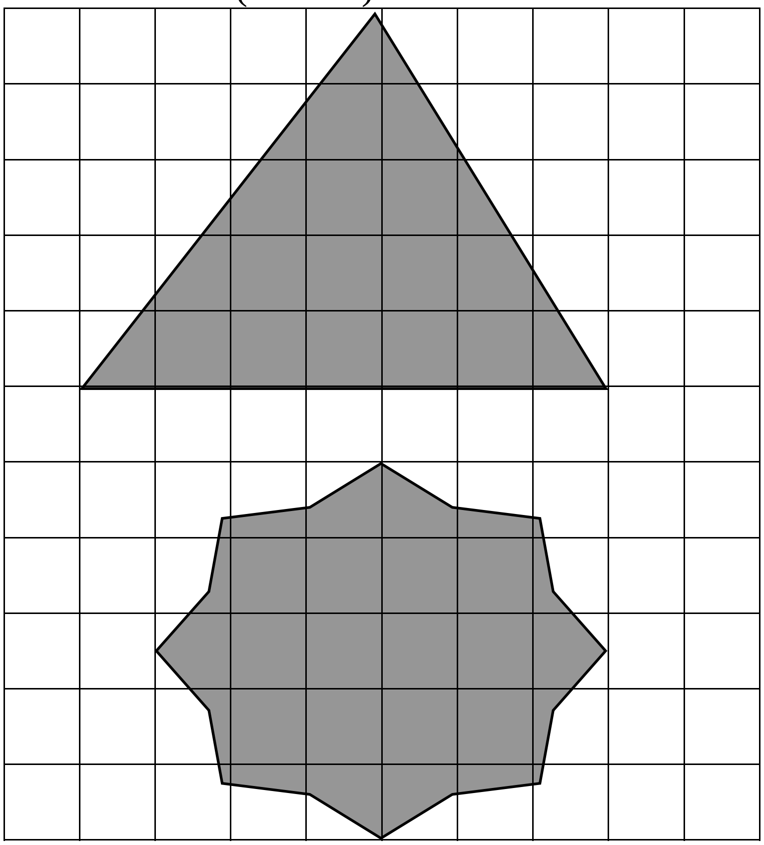


However, the perimeter of all of these is different viz. 14, 14, 16, 16, 26 and 26.
Note that when breadth and length are interchanged, the perimeter remains unchanged.
Thus (a) and (b) are the rectangle whose area is 12 and perimeter is 14.

Area of irregular figures

Cover the irregular area with a centimetre grid where each small square represents one square centimetre. Get an inner measure by counting the whole squares inside the figure and an outer measure by including squares that touch the figure anywhere. The area lies between these two measures. We can take its estimate as the average of the two that is (inner measure + outer measure)/2.

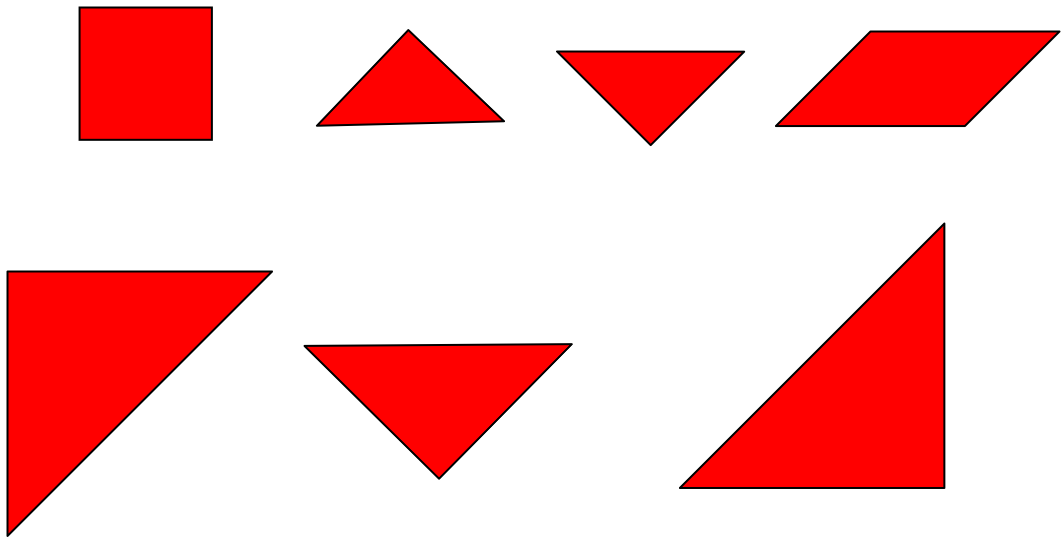
The area of the triangle lies between 8 and 18. we can take its estimate to be (8+18)/2 = 13.
The area of the other irregular figure lies between 12 and 28. we can take its estimate to be (12 + 28)/2 = 20.



If the difference between inner and outer measure is considered large, we can use a smaller grid to get a better estimate.

Area of tangram pieces

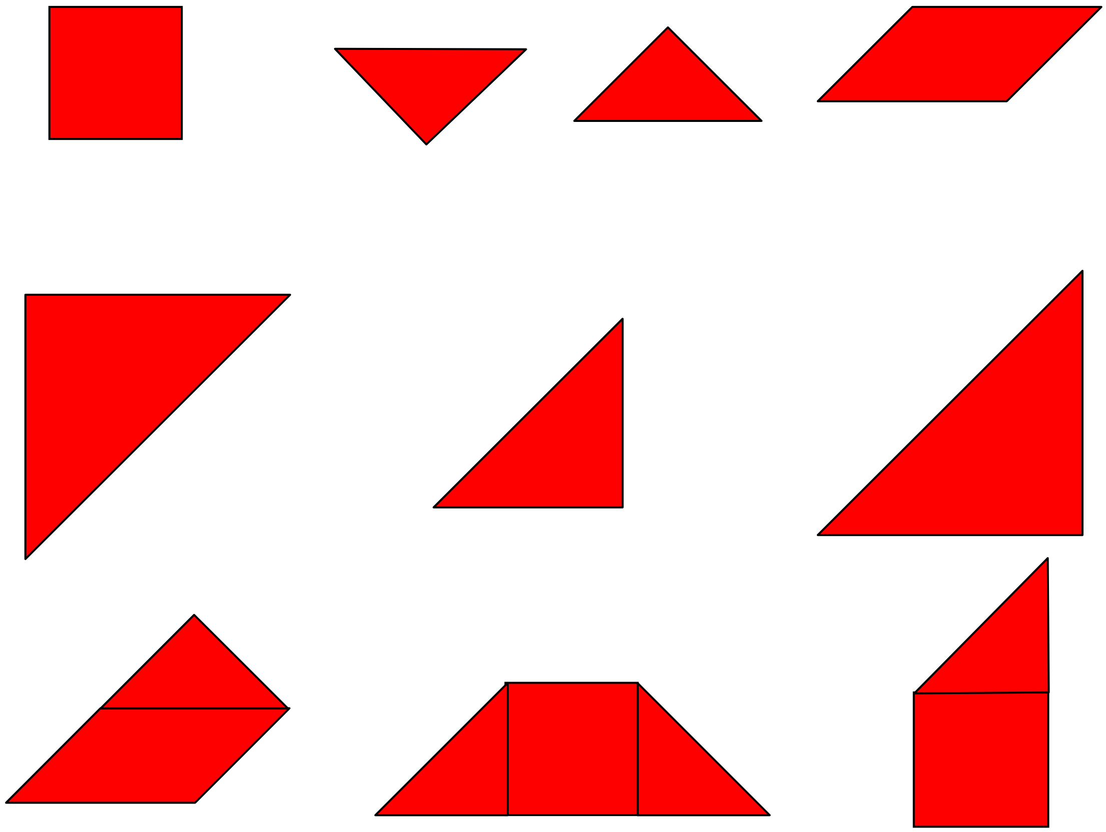
A **tangram** is an old Chinese puzzle and consists of seven tangram pieces



In all the questions given below let the square tangram piece represents one unit of area

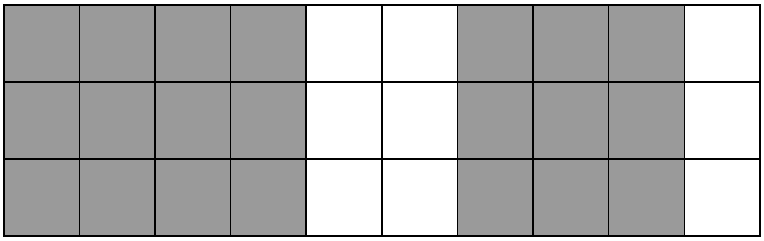
1. Make a square with the two small triangles. What is the area of this square? How did you find out?
   What is the area of the small triangle used? How did you find out
2. Make a (non-square) parallelogram with the two small congruent triangles. What is the area of this parallelogram? How do you know?
3. Make a triangle with the two small congruent triangles. What is the area of this triangle? How do you know?
4. Make a square with medium sized triangle and the two small congruent triangles. What is the area of this square? How did you find out?
   What is the area of the medium triangle? How did you find out?
5. Make a rectangle with the parallelogram and the two small congruent triangles. What is the area of this rectangle? How did you find out?
6. What is the area of larger triangle? How did you find out?
7. Make a square with the two large congruent triangles. What is the area of this square? How do you know?
8. Make a square with all the pieces. What is the area of this square? How did you find out?

9. If the smallest triangle is taken as unit of area and find the area of all the figures given below:

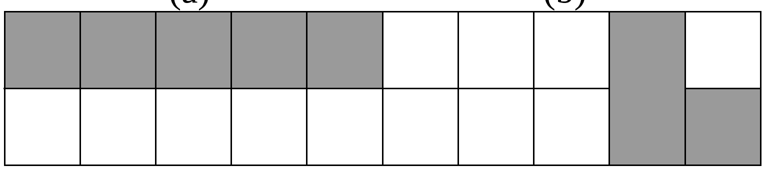


Exercise 7.2

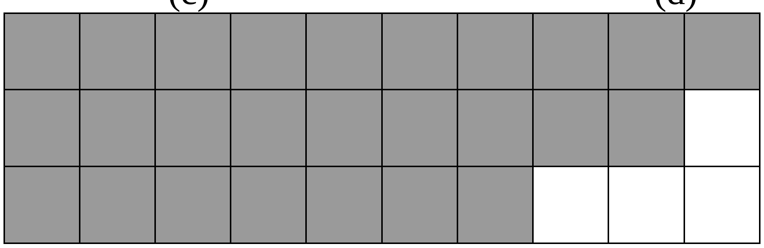
1. Give situations in daily life where we need to find area.
2. Find the area of the figures given below:



(a) (b)



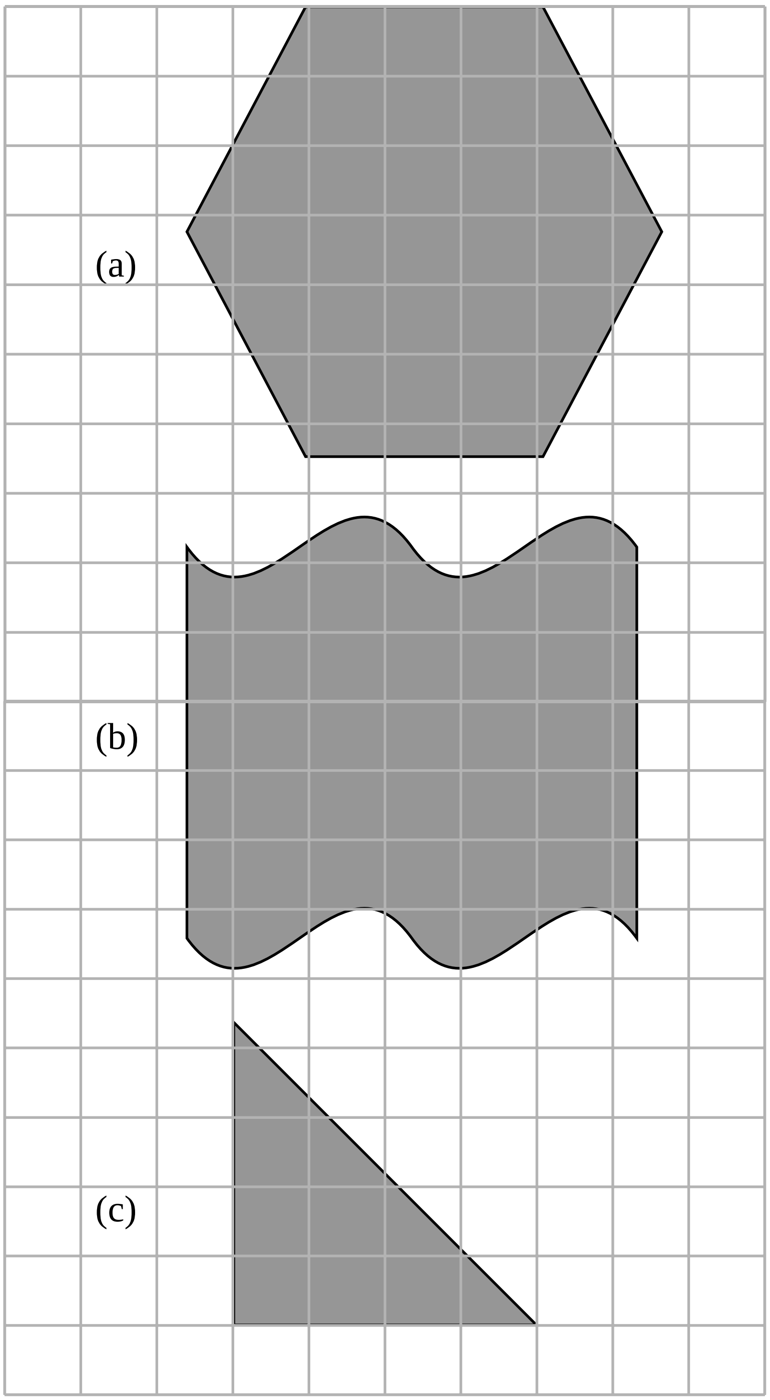
(c) (d)



(e)

3. Taking small square as unit of area, draw all the rectangles you can on the graph paper whose area in units is given below:
   (a) 6 (b) 10 (c) 5
4. Taking small square as unit of area, draw one rectangles for each part on a graph paper whose area in units is as follows:
   (a) 12 (b) 10 (c) 20 (d) 9 (e) 7
5. Taking length of small square as unit of length and its area as unit of area shade rectangles on a graph paper whose area and perimeter and are given below:
   (a) Area 1 unit and perimeter 4 units
   (b) Area 4 units and perimeter 8 units
   (c) Area 4 units and perimeter 10 units
   (d) Area 6 units and perimeter 10 units
   (e) Area 20 units and perimeter 18 units

6. Find areas of rectangles whose length and breadth are given below:
   (a) Length = 4 cm and breadth = 3 cm
   (b) Length = 2 cm and breadth = 5 cm
7. Find area of squares whose sides are given below:
   (a) 4 cm   (b) 3 cm
8. Estimate the area of figures given below the area of a square is 1square centimetre



9. Draw all the rectangles you can on the graph paper that have an area of 14 square centimetres.
10. Draw and cut a square into two pieces.
    (a) Would the sum of their areas be the same as that of the original square?
    (b) Would the sum of their perimeters be the same as that of the original square?
11. Tanya wants to make a quilt using her 12 square pieces. How should she arrange her pieces so that lace required would be minimum?
12. Collect some objects e.g. leaves, coins, CDs, and find area of their faces using the graph paper given in Activity Sheet 14.1.

Volume

Suppose you were packing a football and a cricket ball in a box, which would occupy more space? The space that an object occupies is called its volume.

Measurement of volume

Use of water displacement

Take a jar with little water and mark its level with a grease pencil. Add a marble to it, the water rises a bit, mark the new level. Keep on adding marbles and marking the new levels. Remove the marbles from water and add a few drops of water to return to the level of starting point. Now we have a series of marks on the side of a jar that corresponds to the volume of water displaced by various numbers of marbles. We can now find the volume of various objects in terms of marble units. This technique allows us to determine the volume of irregularly shaped objects such as decoration pieces, stones.

We can use graduated measuring cups with markings in millilitres.

1 litre = 1000 millilitres

The volume of liquids is measured in millilitres or litres.

Counting Cubes

Another method is to construct the model of a given object or fill it with unit cubes whose length, breadth and height is one unit. If the length, breadth and height of cube are one millimetre, unit is called one cubic millimetre. If the length, breadth and height of cube are one centimetre, the volume of a cube is one cubic centimetre. If the length, breadth and height are one metre, the volume is one cubic metre.

Fill a rectangular box with unit cubes without leaving any holes (We will restrict to the case where the dimensions of the box are whole units). The number of cubes that can be filled in the box is its volume in cubic centimetre. For example, if you cut the grid with thick border given below, fold it along the dotted line, and join the borders, you will have an open box.

What is the length, breadth and height of the box (5, 3 and 2 cm).

How many unit cubes you can keep in one layer? ($5 \times 3 = 15$).

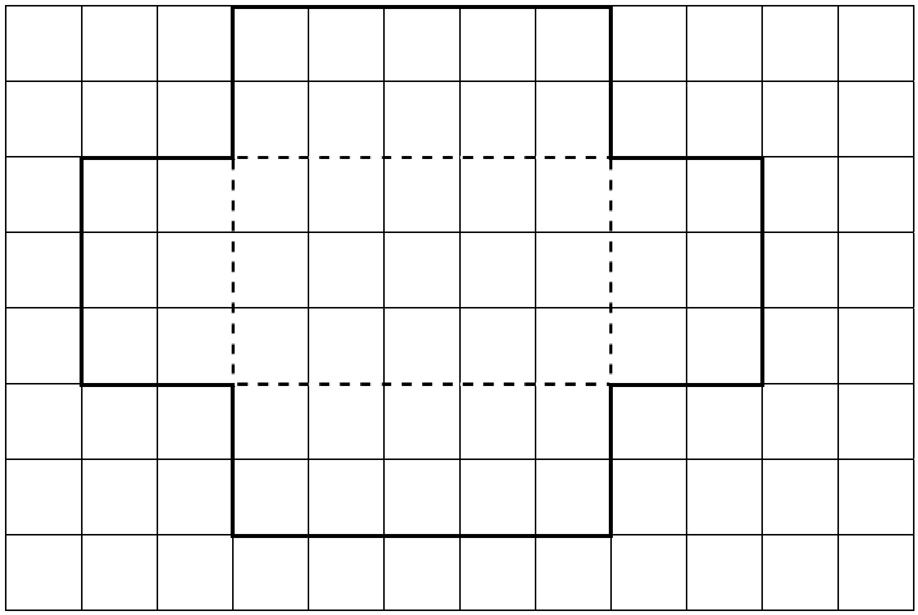
What would be the height of one layer? (1 cm)

How many layers are needed to fill the box (2)?

How many unit cubes will be needed to fill the box? ($15 \times 2 = 30$).

Thus, 30 unit cubes are required to fill the box.

Therefore, the volume of the box is 30 cubic centimetres.



We can find the volume of a cube in general by finding the number of cubes needed to fill a layer of cubes in the box which will be = its length × its breadth and multiplying by the number of layers = its height.

The formula for volume of a rectangular box whose length is l, breadth b and height h is (l × b× h) units.

As in a cube its length, breadth and height are equal.

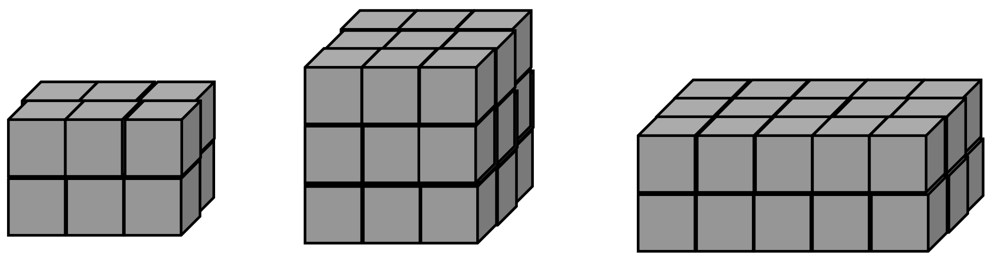
The formula for volume in of a cube whose side is s centimetre = s × s× s units.

Note that units for all dimensions length, breadth and height should be the same. You cannot take some in millimetre, others in centimetre.

The formulae hold whether the measures of length, breadth and height are whole or decimal numbers.

Exercise 7.3

1. Give situations in daily life where we need to find volume.
2. Find the volume of 3 irregular objects by water displacement using a measuring cup or marble units.
3. Find the volume of cuboids made with unit cubes given below:

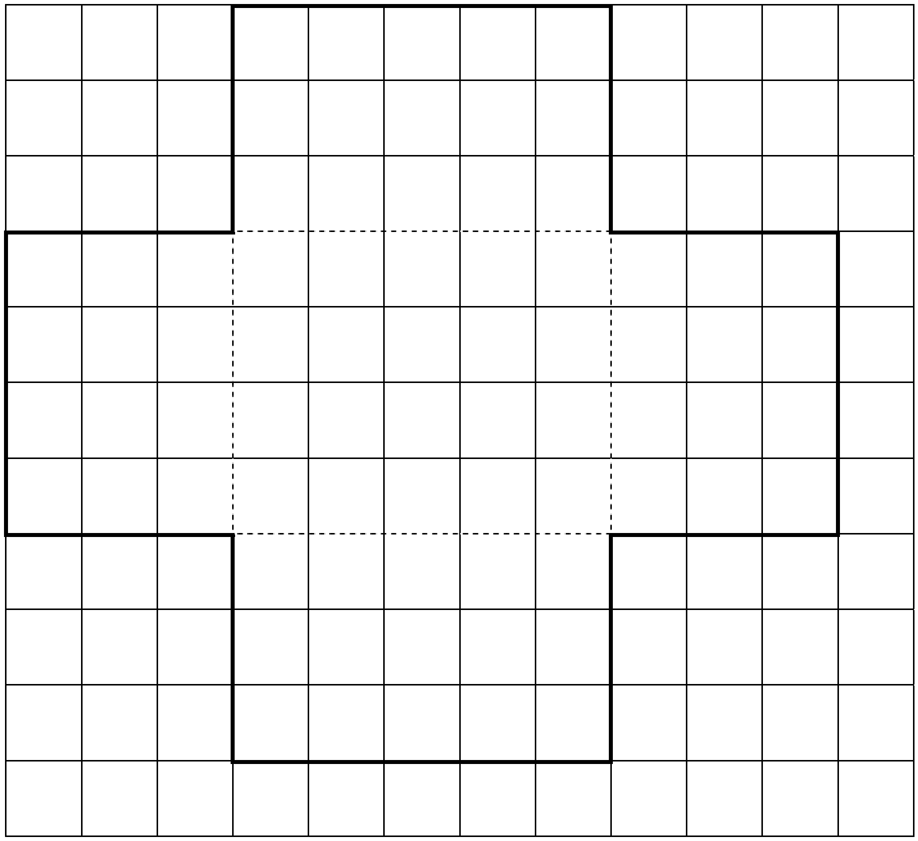


(a) (b) (c)

4. Measure the following amount of water with a measuring cup.
   (a) 100 ml (b) 250 ml (c) 50 ml
5. Is a cube a cuboid?
6. About how many ml would a teacup hold?
   (a) 2 ml (b) 20 ml (c) 200 ml.
7. How many cubes with side 1 cm will be needed to fill a rectangular box whose length is 5 cm, breadth 4 cm and height 2 cm?
8. Find 3 rectangular boxes, measure their length, breadth and height and find their volume.
9. Fill in the entries in the table below:

Side of the cube	Area of a face	Volume
1 cm		
2 cm		
3 cm		

10. A matchbox's are 4 cm, 2 cm and 1 cm respectively. What will be the volume of a packet containing 10 matchboxes?
11. How many soap cakes whose length, breadth and height are 7 cm, 5 cm and 2 cm respectively can be placed in a box whose length, breadth and height are 14 cm, 10 cm and 6 cm respectively?
12. Cut the cm grid with red border and paste it on a thick paper. Fold the paper along dotted lines and join its edges to make a topless box. What are its length, breadth and height? How many cubes whose side is 1 cm will it hold?



13. Make a grid like the one given above on Activity Sheet 7.2 from which an open box can be made whose length, breadth and height are 4 cm, 3 cm and 2 cm respectively.
14. If you have two containers which can hold 8 litres and 5 litres. Describe how you can measure with the help of these the following amount of water:

    (a) 3 litres (b) 2 litres (c) 10 litres

UNIT 8

Collection, Organisation, Presentation and Interpretation of Data

Collection and tallying of real-world data

Make a table as the one given below on the Blackboard. Ask students one by one about the fruit they would prefer to have among the listed fruits for midday meal. Write the name of the fruits and mark a tally-| for each students that names it in a table as the one given below.

Name of the fruit	Number of students who would like to have it
Banana	
Guava	
Orange	
Apple	

(A tally | represents one student)

Call on a volunteer to count number of tallies in each row and record the number at the end of the row. Tell them it would make the counting easier if we record the fifth entry by making a diagonal mark across the first four lines (卌).]. Call on a volunteer to redraw the tallies using the grouping notation in another table and then ask

1. Did it make easier to count the tallies in the tally graph?
2. Why did that notation make it easier?
3. What heading would you like to give to the table that will describe the data in it?
4. How did we show what we found out?

We can present a summary of this information in a similar table by writing the number against fruits instead of tallies

Name of the fruit	Number of students whose favorite it is
Bananas	
Guava	
Orange	
Apple	

Converting a table into a pictograph

Ask the class to draw a pictograph of the above data using smiley faces (☺) to represent one student.

Then ask questions for both the pictographs like the ones given below:

1. How many children does a smiley face represent?
2. How many children prefer bananas?
3. How many children prefer guavas?
4. Which fruit is preferred by most students?
5. How is a tally graph similar to a pictograph?
6. How is a tally graph different from a pictograph?

Ask the class to draw a pictograph of the above data using smiley faces (☺) to represent 2 students.

1. How many children does a smiley face represent?
2. How many children prefer bananas?
3. How many children prefer guavas?
4. Which fruit is preferred by most students?
5. Was it easier to draw from the grouped tallies or single tallies?
6. As the number of students in a category may not always be a multiple of 2, how did you handle that?
7. What are the advantages and disadvantages of using a smiley face to represent one student?
8. What are the advantages and disadvantages of using a smiley face to represent more than one student?

Bar graphs

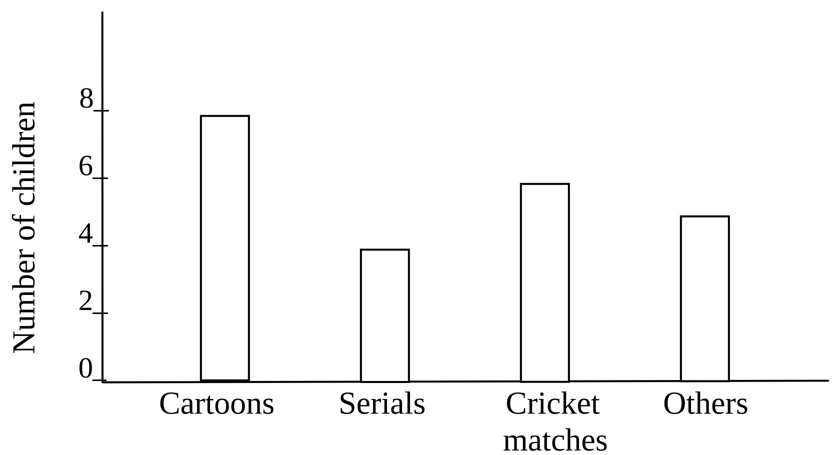
Representation of data by a pictograph is time consuming and sometimes it is difficult to show it. Another visual presentation of data in a table is by a **bar graph**.

To create a bar graph,

1. Draw two lines at right angles to each other.
2. Write the name of categories along the horizontal line (or vertical) and choose a scale for length of the bar along the vertical (or horizontal) scale.
3. Erect bars of uniform width vertically (or horizontally) for each category with length equal to the number in a category. The bars should have equal spacing between them.

For example, we can represent the data on favourite TV programme of a class in a bar graph as follows:

Favourite TV programmes of children in class V



1. How many children prefer to watch cartoons?
2. How many children prefer to watch cricket matches?
3. Which kind of programme is most popular?
4. Which kind of programme is least popular?
5. How many more children prefer to watch cricket matches than serials?

Collection and Representation of quantitative data

So far we have been concerned with qualitative or categorical data; however there is lot of quantitative data such as height and weight, marks in an examination for a class in which we may be interested. This data is collected by measurements by an instrument or test. As there would be large number of values of the variable. It would be difficult to comprehend it. We summarize it by grouping it in a few categories usually 10 – 20 called **intervals** and specifying limits of intervals that are taken to be of equal width. Then we can summarize it in a table like the one for categorical or

qualitative data by looking at each value and marking a tally in the appropriate interval. For example, students in a class got the following marks in mathematics annual examination:

67, 78, 85, 72, 40, 67, 89, 32, 60, 78, 75, 49, 50, 90, 94, 71, 82, 63, 65, 84, 59, 43, 74, 90, 43, 56, 70, 67, 45, 33, 54, 50, 61, 45, 52, 78, 77, 92, and 54.

We first have to decide on the number and width of intervals. For this we look at the highest and lowest score, which for the above data are 94 and 32 respectively. A width of 5 marks would give us 13 intervals we may decide on that. Now we look at each score and mark a tally mark for that in the appropriate interval. For example, the first mark is 67; we mark a tally mark for that in the interval 65 – 69, the next mark is 78, so we mark a tally mark for that in the interval 75 – 79 and so on. Our table after all the marks have been thus marked would be

<table>
<tr><th>Marks</th><th>Tallies for</th><th>Number of</th></tr>
<tr><td>30 – 34</td><td>||</td><td>2</td></tr>
<tr><td>35 – 39</td><td></td><td>0</td></tr>
<tr><td>40 – 44</td><td>||||</td><td>4</td></tr>
<tr><td>45 – 49</td><td>||</td><td>2</td></tr>
<tr><td>50 – 54</td><td>||||</td><td>5</td></tr>
<tr><td>55 – 59</td><td>||</td><td>2</td></tr>
<tr><td>60 – 64</td><td>|||</td><td>3</td></tr>
<tr><td>65 – 69</td><td>||||</td><td>4</td></tr>
<tr><td>70 – 74</td><td>||||</td><td>5</td></tr>
<tr><td>75 – 79</td><td>||||</td><td>4</td></tr>
<tr><td>80 – 84</td><td>||</td><td>2</td></tr>
<tr><td>85 – 89</td><td>||</td><td>2</td></tr>
<tr><td>90 - 94</td><td>||||</td><td>4</td></tr>
</table>

Write the number of tallies against them.

This table can be read in a similar manner as the tables for categorical data. It also aids in finding how many students got below the lower limit of an interval, by adding number of students in the intervals below that. For example to find the number of students who scored below 40, we add the number of students who obtained scores between 35 and 39 and between 30 and 34. that is 0 + 2 = 2. Similarly we can find out how many got above the lower limit of an interval by adding number of students in that interval and

the intervals above that. For example to find the number of students whoscored above 80, we add the number of students who obtained scores between 80 and 84 and between 85 and 89, between 90 and 94 that is 2 + 2 + 4 = 8.

Exercise 8.1

1. The following pictograph gives the number of children in different classes in a primary school.

Class	Number of children in different classes
I	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
II	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☹ ☹
III	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☹
IV	☺ ☺ ☺ ☺ ☺ ☺ ☺
V	☺ ☺ ☺ ☺ ☺ ☺ ☺

☺ = 5 children

(a) How many children does a face represent?
(b) How many children are there in class I?
(c) How many children are there in class III?
(d) Which class has the maximum number of children?
(e) Which class has the minimum number of children?
(f) Do you notice a trend as we move from class 1 to higher classes?
(g) Make a bar graph of the above data on a graph paper.

2. The data of a class about their favorite TV programme is recorded in the Tally Chart given below

TV	Number of students who prefer the programme
Cartoons	|||| |||| |||| ||
Serials	~~||||~~ ~~||||~~ | /
Movies	|||| |||| |||
Sports	~~||||~~ /

(a) How many children prefer to see cartoons?
(b) How many children prefer to see movies?
(c) How many more children prefer to see cartoons rather than serials?
(d) Record this data in a table using Activity Sheet 1.
(e)Make a pictograph of the data given in the above table using a smiley face to represent 2 children.

3. Give situations in which you will represent a smiley face or any other object to represent
   (a) 1 object or person
   (b) more than 1 object or person.
4. Make a bar graph of the above data. Does it provide the same information as a pictograph?

   Project

   Pass on paper preferably cards to the whole class to give their responses to questions such as what is your favourite ice cream, what do you like to do in free time, what kind of books do you like to read fiction or non fiction, and other data they may be interested in. Ask them to write the answers to each of these on a separate paper and collect answers to each question one at a time.

   Form groups of 4 children and pass to each group data collected from all the students in the class to different questions.

   Ask each group to do the following:

   1. Record the data in Activity Sheet 8.1 by filling in the entries in the first row and first column and making a tally chart of the data
   2. Make a pictographs with a picture representing 2 or more objects or persons
   3. Give a heading to the table.
   4. Make a bar graph of the above data.
   5. Present their findings to the class.
   6. Do the table, pictograph and bar graph provide the same information?
   7. Which representation of data would you prefer and why?
   8. The data on marks in a mathematics test with maximum marks of 100 is given below:

Marks	Number of students getting those marks
0 - 9	$\vert$
10 – 19	$\vert\vert$
20 – 29	
30 – 39	$\cancel{\vert\vert\vert\vert}\ \vert\vert$

40 – 49	$\vert\vert\vert\vert\ \vert\vert\vert$
50 – 59	$\cancel{\vert\vert\vert\vert}\ \vert\vert$
60 – 69	$\vert\vert\vert$
70 – 79	$\cancel{\vert\vert\vert\vert}$
80 - 89	$\cancel{\vert\vert\vert\vert}\ \cancel{\vert\vert\vert\vert}\ \vert$
90 - 99	$\vert\vert\vert$

(a) How many students got marks between 30 and 39?
(b) How many students got marks between 20 and 29?
(c) How many students got marks below 40?
(d) How many students got 80 marks or more?
(e) How many students got 90 marks or more?
(f) How many students got marks between 60 and 69?

9. The data on marks in a mathematics test with maximum marks of 10 is given below:
   5, 7, 10, 0, 6, 5, 4, 2, 8, 7, 6, 9, 4, 5, 6, 8, 4, 6, 8, 9, 10, 1, 4, 2, 7, 8, 9, 6, 8, 9, 3, 7, 4 and 8.
   Make a table of the data.
10. The data on marks in a science annual examination with maximum marks of 100 for a class is given below:
   40, 67, 43, 80, 94, 83, 80, 50, 62, 45, 43, 67, 84, 91, 74, 76, 80, 93, 65, 38, 25, 90, 83, 70, 23, 79, 64, 34, 92, 72, 57, 53 and 64.
   Fill in the table given below:

Marks	Number of students getting those marks
Below 30	
30 – 34	
35 – 39	
40 – 44	
45 – 49	
50 – 54	
55 – 59	
60 – 64	
65 – 69	
70 – 74	
75 – 79	
80 – 84	
85 – 89	
90 - 94	

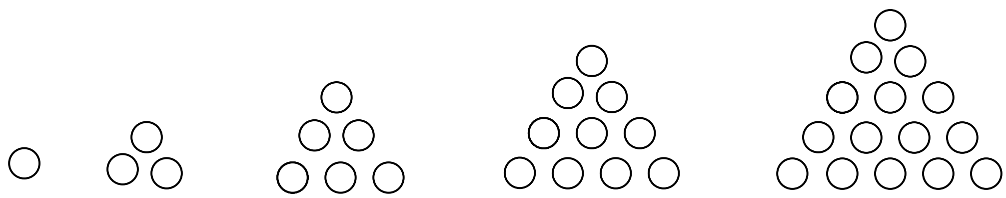
Project
Teacher may divide the class into groups and ask each group to collect data on variables like the height, weight, time in minutes they watch TV and other variables they may be interested for all children in the class and arrange it in a table. Ask them to present it in class and discuss it.

UNIT 9

Number Patterns

In all areas of mathematics, we can find number patterns:

Triangular numbers

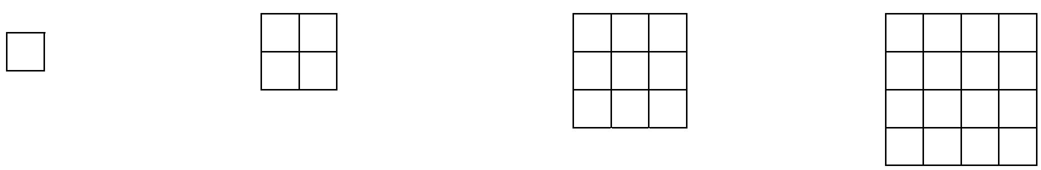


1   1 + 2 =3   1 + 2 + 3 = 6   1 + 2 + 3 + 4 = 10   1 + 2 + 3 + 4 + 5 = 15

1, 3, 6, 10, 15… are called triangular numbers.

Square numbers

A square number is a number whose units can be arranged into squares.

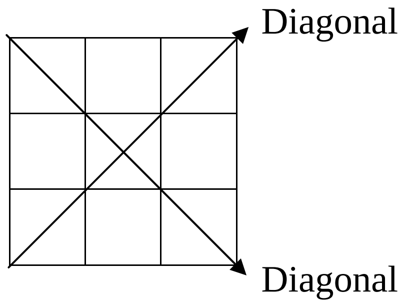


1	2	3	4
1×1	2×2	3×3	4×4

Magic Squares

A magic square has numbers such that sum of numbers in all rows, columns and diagonals give the same sum called magic number.

Fill in the cells in the square given below with numbers 1 to 9, using each number once only so sum of number in all rows, columns and across diagonals is 15. Some of the numbers (in black) are filled.



2	7	6
9	5	1
4	3	8

The cell in the second column and first row would have a number= 15 - (5 + 3)= 7

The cell in the first column and second row would have a number= 15 - (5 + 1) = 15 - 6 = 9.

We have used numbers 1, 3, 5, 7 and 9. Only 2, 4, 6 and 8 are left.

In the first column, we need numbers whose sum is 6, so we put 2 and 4 there. (We may have to use trial and error to check where to put 2 and 4)

The number in the first row, third column will be= 15 - (2 +7) =6.

The number in the third row and third column will be = 15 - (1 + 6) = 8.

The numbers in the diagonals also add to 15.

Number Triangles

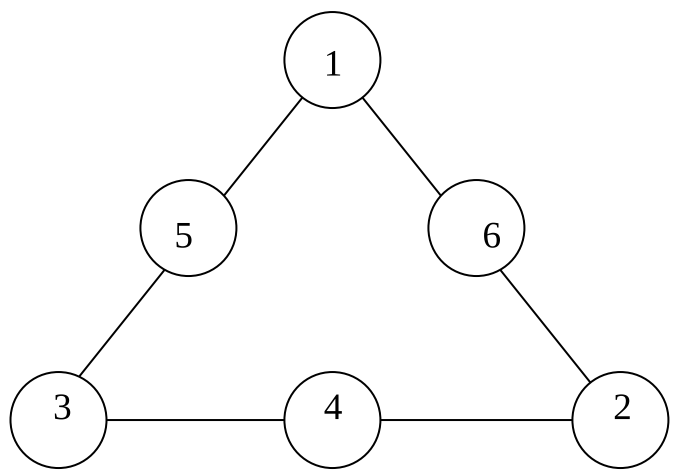
Write the numbers 1 to 6 in circles so that each side of the triangle adds to 9.
We can write 9 as sum of three different numbers using numbers 1 to 6

9 = 4 + 3 +2

9 = 6 + 2 +1

9 = 5 + 3 +1

As 1, 2 and 3 occur twice in these combinations, we fill in those in the corners and then fill in the remaining numbers.



Exercise 2.6

1. Fill in the blank cells so that all rows, columns and diagonals add to magic number 12

		5
	4	6

2. Fill in the blank cells so that all rows, columns and diagonals add to magic number 18

	4	
	8	3

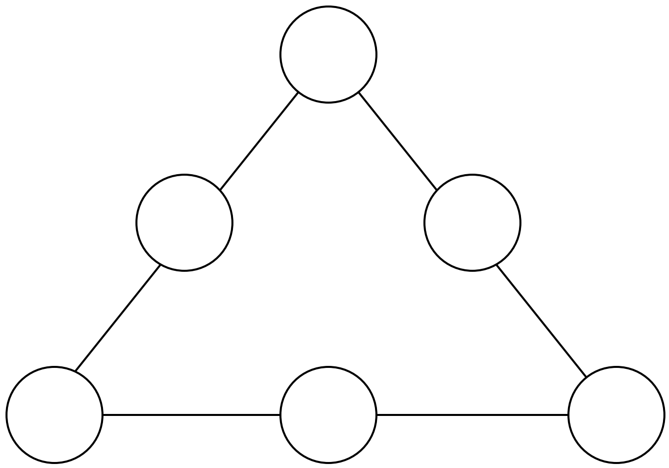
3. Complete these and write the next two expressions using the same pattern
   $1 + 2 =$
   $1 + 2 + 3 =$
   $1 + 2 + 3 + 4 =$
   $1 + 2 + 3 + 4 + 5 =$
   What kind of numbers are these?
4. Write the next two expressions using the same pattern
   $1 + 3 = 4 = 2 \times 2$
   $1 + 3 + 5 = 9 = 3 \times 3$
   $1 + 3 + 5 + 7 = 16 = 4 \times 4$.
   What kind of numbers are these?
5. Look carefully at the numbers given below. Try to see how they have been created.
   11 = 2
   14= 5
   29 = 11 = 2
   77 = 14 =5
   95 = 14 = 5

123 = 6

Complete the following using the same pattern

(a) 24 (b) 37 (c) 78 (d) 145 (e) 452 (f) 2451

6. Write the numbers 1 to 6 in circles so that each side of the triangle adds to 10.



Complete the multiplications below:

$5 \times 5 =$	$4 \times 6 =$
$3 \times 3=$	$2 \times 4 =$
$6 \times 6 =$	$5 \times 7 =$
$8 \times 8.=$	$7 \times 9 =$

(a) Explain the pattern you have found.

(b) Use the above pattern to write down the answers to the following without working them out

(i) If $24 \times 24 = 576$, then $23 \times 25 =$

(ii) If $37 \times 37 = 1369$, then $36 \times 38 =$

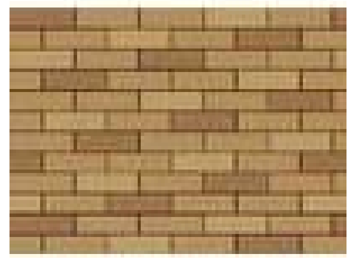
(c) Find an easy way to find

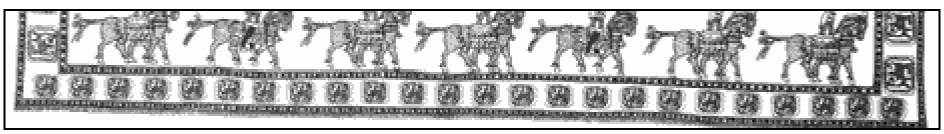
(i) 19×21

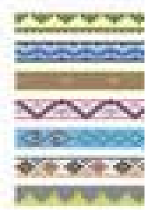
(ii) 29×31

Makes Border Strips and Tiling Patterns

We find patterns all around us in bed covers, cushion covers, saris, carpets, tiles and many other things in our environment. Some patterns in different objects are given below:







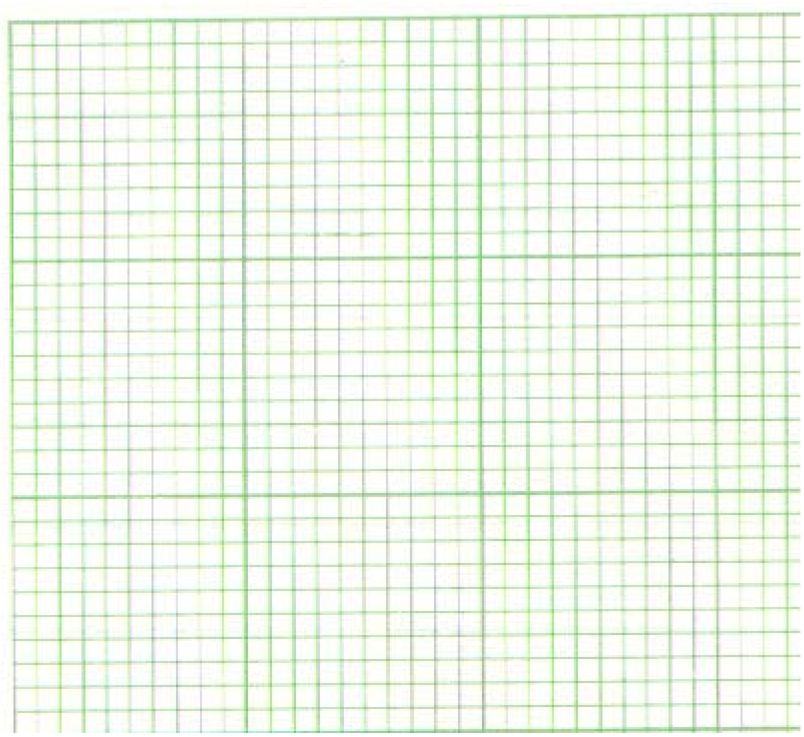
Project

Collect and make some patterns.

Activity Sheets

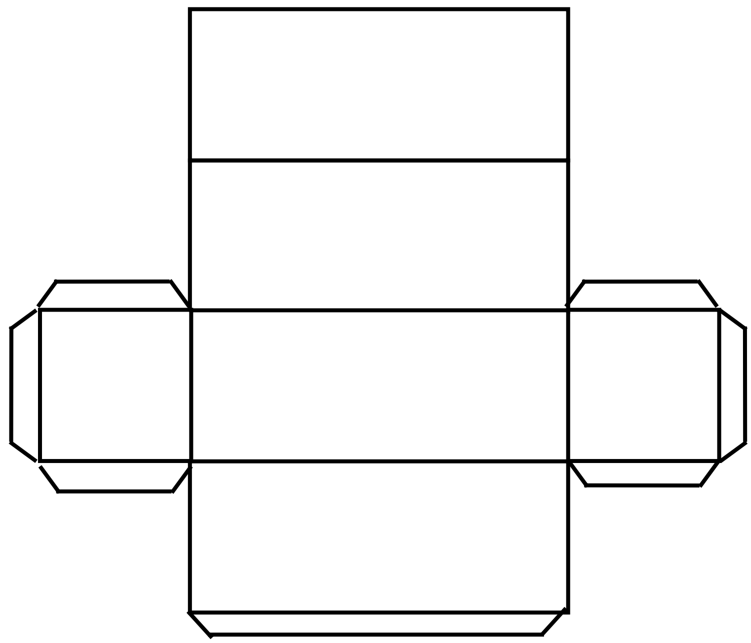
Activity Sheet 4.

Graph Paper



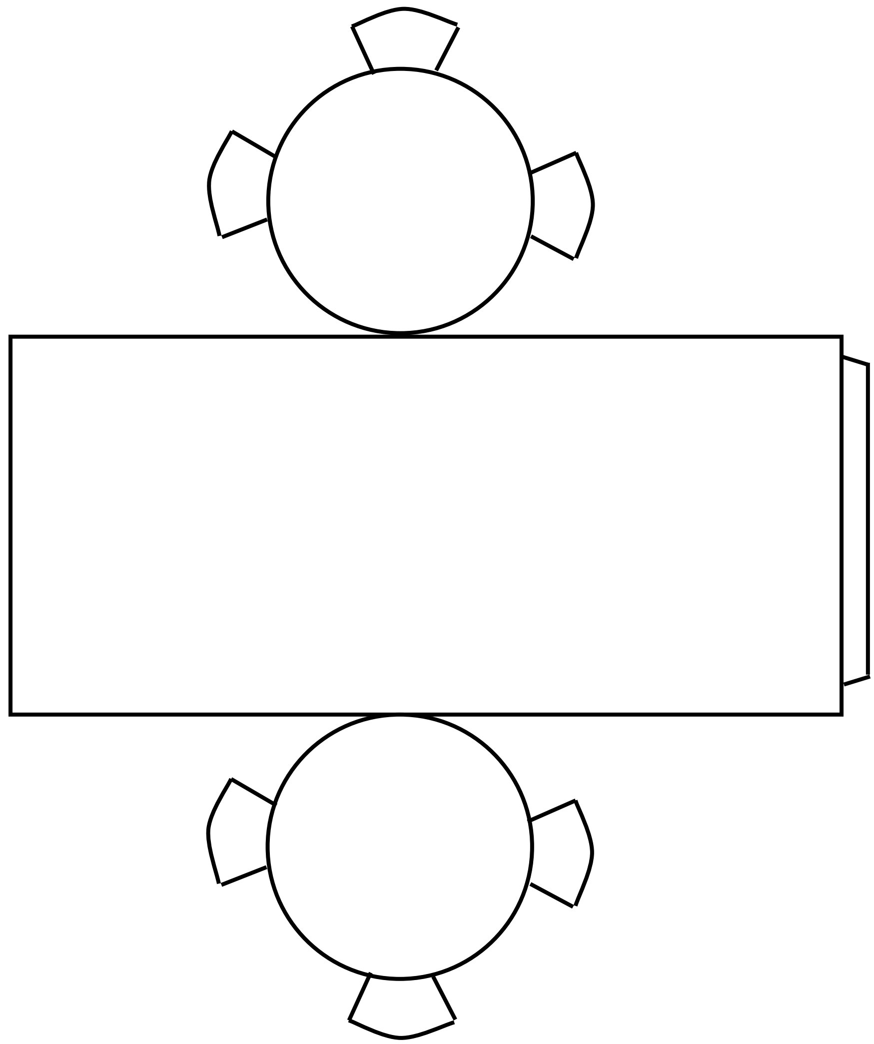
Activity Sheet 5.1

Net for a cuboid



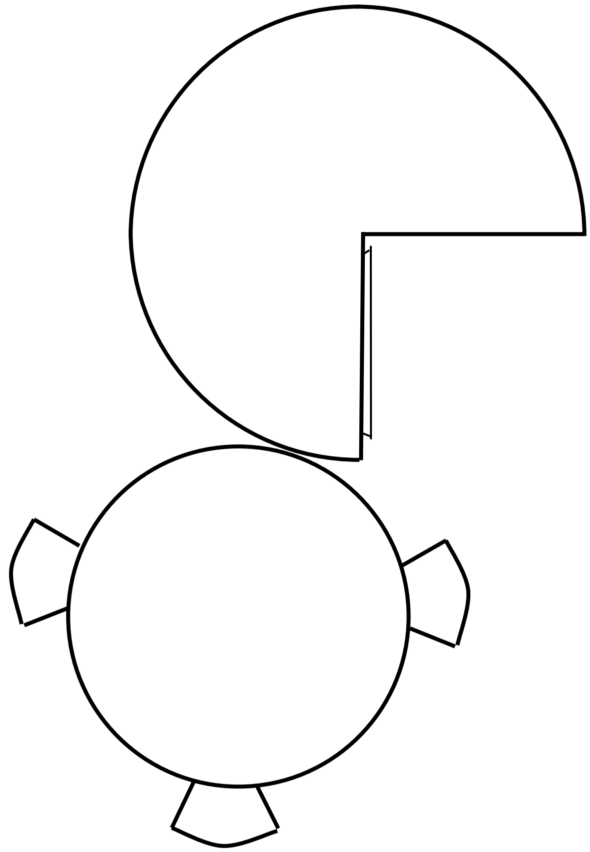
Activity Sheet 5.2

Net for a cylinder

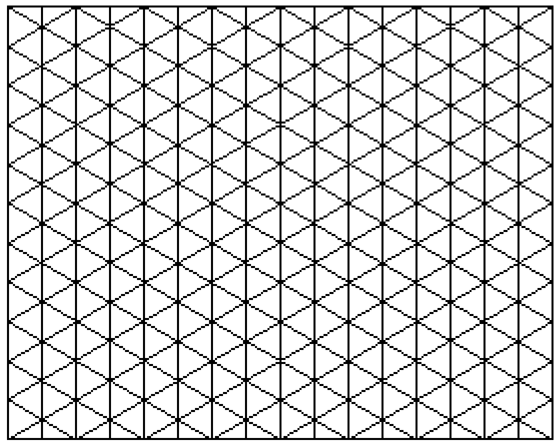


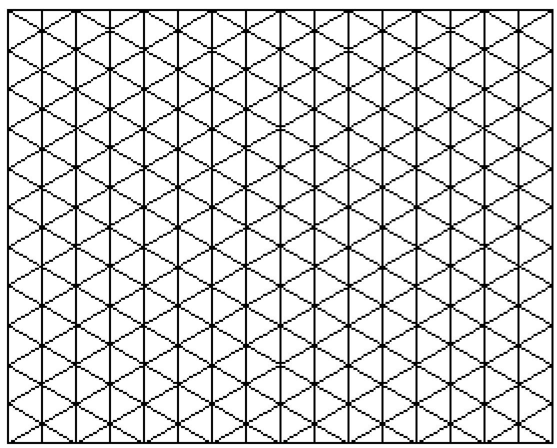
Activity Sheet 5.3

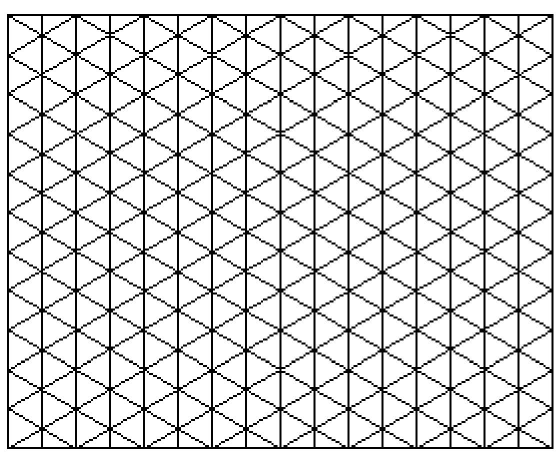
Net for a Cone



Activity Sheet 5.4

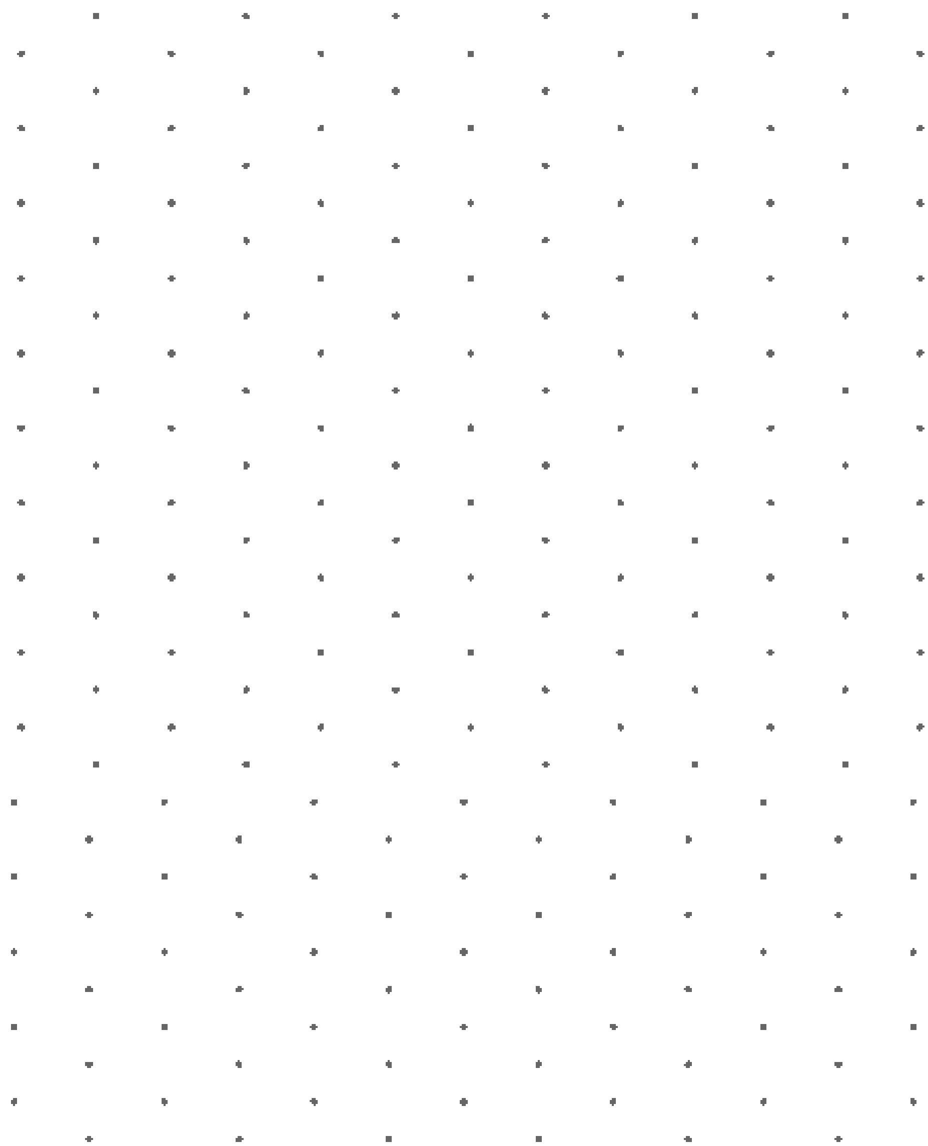






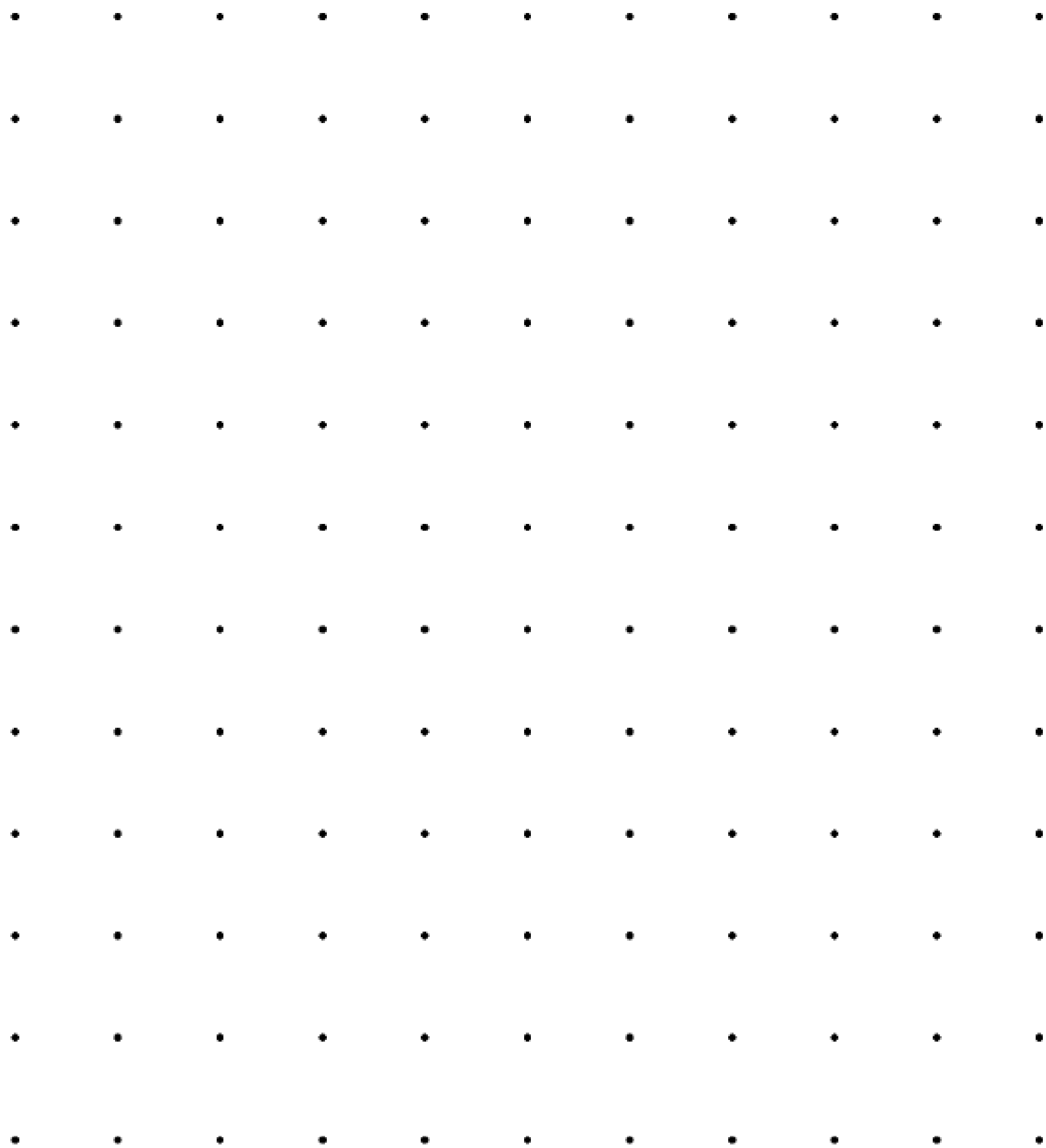
Activity Sheet 5.5

Isometric Dot Paper

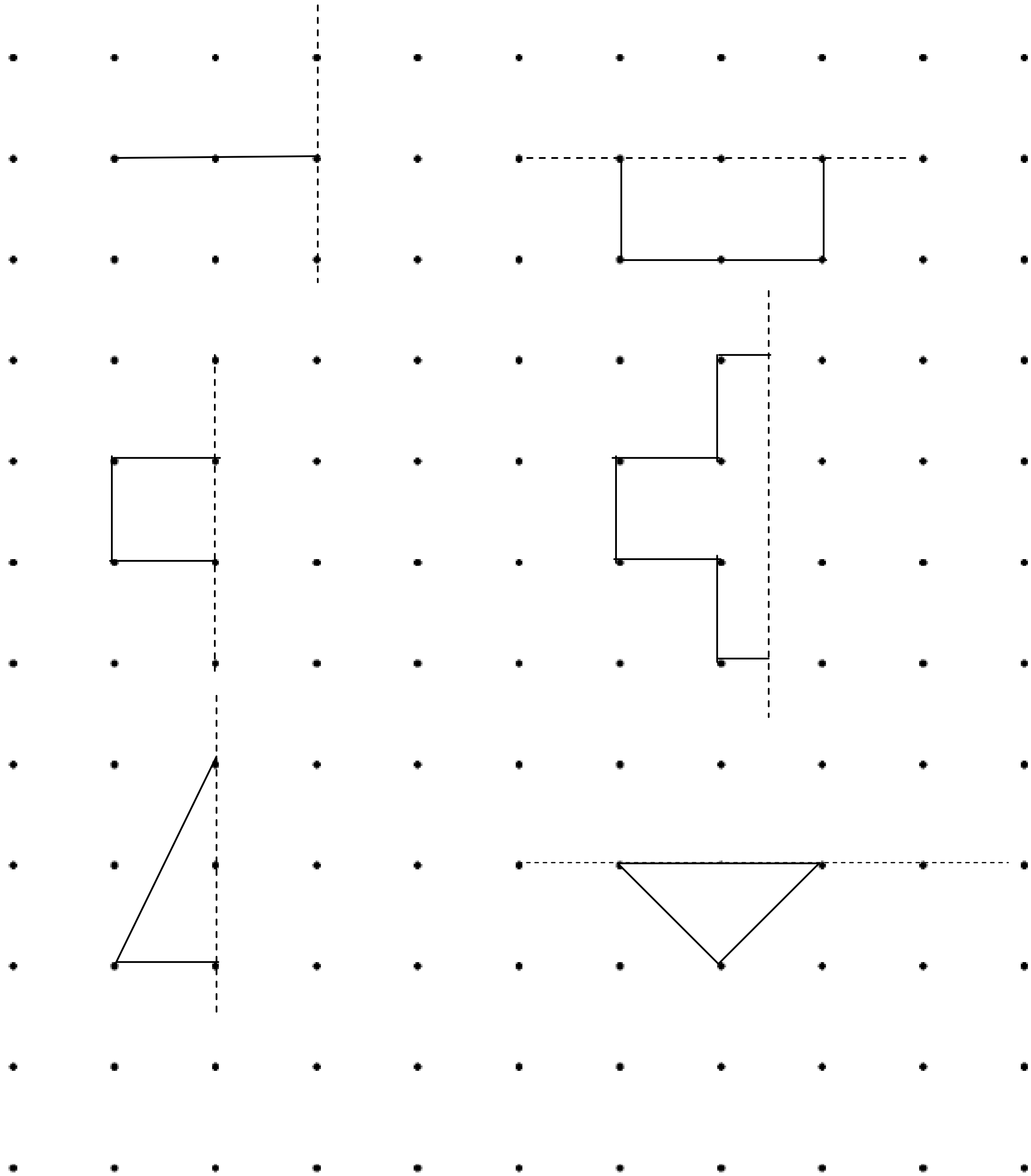


Activity Sheet 5.6

Dot or Geo Paper



Activity Sheet 5.7



Activity Sheet 7.1

Activity Sheet 7.2

Activity Sheet 8.**1**

Appendix 1

Hundred Table

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Answers to Selected Exercises

Exercise 2.1

1. (a) 7 (b) 6 (c) 2 (d) 21 (e) 6
   (f) 4 (g) 6 (h) 4
2. (a) 35, 42 (b) 16, 32 (c) 25, 36
3. (a) 3780 (b) 19280 (c) 252700 (d) 261200
4. (a) 29869 (b) 33515 (c) 30054 (d) 1666
   (e) 3680 (f) 5952 (g) 2520 (h) 14014
   (i) 74292 (j) 307330 (k) 181442 (l) 120681
7. (a) 3024 (b) 4000 (c) 5400 (d) 6000
   (e) 24000 (f) 49000 (g) 120000 (h) 150000
   (i) 340000

Exercise 2.2

1. (a) 74 (b) 8 (c) 9 (d) 2
2. (a) 23 (b) 0 (c) 1
3. (a) 2, 1 (b) 10, 1
4. (a) 70 (b) 90 (c) 250 (d) 160
5. (a) 500 (b) 400 (c) 1500 (d) 18000

Exercise 2.3

1. 44 2. 1350 3. 4150 4. 108, 12 5. 480
6. 9 7. 8, 6 8. 10 9. 30 10. 5
11.(a) We need to know how much money Bill gave to the shopkeeper to answer this.
   (b) 4
14.(a) 7,9 (b) 70 (c) 31 (d). 999 (e) 10
   (f) Any number

Exercise 3.1

6. 1, 5
7. (a) 1, the number itself (b) the number itself (c) even (d) 2
8. (a) 2, 4, 6, 8, 0
   (b) 1, 3, 5, 7, 9
   (c) 5, 0

(d) 10

9. 6, 20, 64 10. 1, 63, 57, 91

11. (a) No (b) Yes (c) Yes

12. (a) 21, 45, 53 because they are odd numbers.
 (b) 21, 53 because the no. in one's place is not 0 or 5
 (c) 21, 45, 53 because 2 a factor of 4 is not a factor of these.
 (d) 21, 45, 53 because the no. in one's place is not 0
 (e) 21, 45, 53 because 2 a factor of 6 is not a factor of these.

13. 56, 7 and 8 are both factors of 56 or 56 is a multiple of both 7 and 8

15. Yes

16. No, 4 is a factor of 12 but 8 is not a factor of 12.

17. (a) 1, 2, 4, 8, 16
 (b) 1, 2, 3, 5, 6, 10, 15, 30
 (c) 1, 2, 3, 4, 6, 8, 12, 24
 (d) 1, 2, 4, 5, 8, 10, 20, 40

Exercise 3.2

1. 3, 5, 7
2. Finding all its factors, if it has only two factors it is prime, if more than two it is composite.
3. (a) 2 (b) 5 (c) 2, 4 (d) 2, 5, 10 (e) 1
 (f) 2, 3, 6
4. (a) $2 \times 3 \times 5$ (b) $2 \times 2 \times 2 \times 5$ (c) $2\times 2 \times 2 \times 2 \times 3$
 (d) $2 \times 2 \times 3 \times 3$
5. (a) 4 (b) 6 (c) 12 (d) 8 (e) 18 (f) 7
6. (a) 15 (b) 60 (c) 12

Exercise 3.3

1. (a) 3, 6, 9, 12, 15
 (b) 7, 14, 21, 28, 35
 (c) 9, 18, 27, 36, 45
 (d) 12, 24, 36, 48, 60
 (e) 20, 40, 60, 80, 100
2. (a) 12, 24 (b) 24, 48 (c) 60, 120
3. (a) 6 (b) 35 (c) 33 (d) 15 (e) 21 (f) 26
 (g) LCM of all these is the product of the numbers
 (h) Only if both the numbers are prime
4. (a) 9 (b) 4 (c) 12 (d) 8 (e) 20 (f) 22

(g) The LCM is the larger of two numbers.

(h) Only if the smaller number is a factor of the larger number.

5. (a) 12 (b) 60 (c) 150 (d) 72 (e) 240 (f) 448

6. (a) 8,4 (b) 120, 4 (c) 140, 10

(d) The product of LCM and HCF is the same as product of numbers

Exercise 4.1

1. (a) $\frac{2}{3}$ (b) $\frac{3}{7}$ (c) $\frac{5}{7}$ (d) $\frac{1}{3}$ (e) $\frac{1}{2}$ (f) $\frac{2}{4}$

2. $\frac{4}{10} or \frac{2}{5}$

3. (a) $\frac{2}{4}$ (b) $\frac{3}{7}$ (c) $\frac{5}{6}$

4. (a) $\frac{2}{4}, \frac{3}{6}, \frac{4}{8}$ (b) $\frac{1}{3}, \frac{2}{6}$ (c) $\frac{2}{8}, \frac{1}{4}$ (d) $\frac{4}{6}, \frac{2}{3}$

5. (a) < (b) > (c) > (d) < (e) > (f) >
   (g) > (h) =

6. (a) $\frac{1}{3}, \frac{2}{3}, \frac{3}{3}$ (b) $\frac{2}{4}, \frac{3}{4}, \frac{4}{4}$ (c) $\frac{2}{10}, \frac{4}{10}, \frac{7}{10}$

7. (a) $\frac{4}{5}, \frac{3}{5}, \frac{2}{5}$ (b) $\frac{7}{8}, \frac{4}{8}, \frac{3}{8}, \frac{2}{8}$ (c) $\frac{10}{12}, \frac{6}{12}, \frac{5}{12}$

8. (a) $\frac{1}{8}, \frac{1}{7}, \frac{1}{4}$ (b) $\frac{1}{6}, \frac{1}{5}, \frac{1}{2}$ (c) $\frac{1}{12}, \frac{1}{9}, \frac{1}{7}$

9. (a) $\frac{3}{4}, \frac{3}{6}, \frac{3}{7}$ (b) $\frac{2}{3}, \frac{2}{5}, \frac{2}{8}$ (c) $\frac{6}{8}, \frac{6}{10}, \frac{6}{15}$

10 (a) $\frac{7}{8}$ (b) $\frac{4}{7}$

Exercise 4.2

1. (a) 1.2 (b) 2.0 (c) 0.6 (d) 0.5
2. (a) 4 tenths (b) 1 unit and 8 tenths (c) 2 units
   (d) 3 units and 9 tenths (e) 24 units and 9 tenths
4. (a) 0.5 (b) 1.6 (c) 10.4
5. (a) $\frac{7}{10}$ (b) $1\frac{4}{10}$ (c) $2\frac{3}{10}$ (d) 5 (e) $10\frac{3}{10}$

6. (a) 0.3 (b) 2.6 (c) 3.9 (d) 0.4

Exercise 4.3

1. (a) (b) (c) (d)
   (e) (f) (g) (h)
2. (a) 0.5 (b) 2.7 (c) 13.6 (d) 0.62
   (e) 10.4 (f) 0.64 (g) 0.40 (h) 0.03
3. (a) Eight tenths (b) Seven and six tenths
   (c) Eight (d) Fifteen and nine tenths
   (e) Seventy six and eight tenths (f) Seventy eight hundredths
   (g) Eight and forty five hundredths (h) Nine and fifty hundredths
   (i) Forty five and seven hundredths (j) Four hundredths
4. (a) 0.7 (b) 5.6 (c) 10.9 (d) 15.9 (e) 2.5
   (f) 0.73 (g) 4.56 (h) 0.50 (i) 74.67 (i) 0.08
5. (a) $\frac{4}{10}$ (b) $2\frac{7}{10}$ (c) $3\frac{5}{10}$ (d) $6\frac{2}{10}$ (e) $\frac{49}{100}$

   (f) $6\frac{78}{100}$ (g) $7\frac{50}{100}$ (h) $23\frac{3}{100}$

6 (a) 0.44 (b) 1.4 (c) 2.76 (d) 0.0 (e) 1.3 (f) 3.05

Exercise 4.4

1. (a) 0.7 (b) 1.3 (c) 0.47 (d) 0.41 (e) 0.03
   (f) 0.46 (g) 0.09 (h) 0.40 (i) 0.4 (j) 0.5
2. (a) $\frac{3}{10}$ (b) $\frac{72}{100}$ (c) $\frac{5}{100}$ (d) $4\frac{9}{100}$

3. (a) 0.7 (b) 0.17 (c) 0.06 (d) 8.5
4. (a) Four tenths (b) Thirteen hundredths (c) 5 hundredths
   (d) Twenty three hundredths
5. (a) 0.70 (b) 0.46 (c) 0.30
6. (a) 0.5 (b) 0.7 (c) 2
7. (a) 0.42 (b) 0.67 (c) 1.59
8. (a) > (b) < (c) =
   (d) > (e) < (f) >
9. (a) 0.34, 0.6, 0.65
   (b) 0.46, 0.5, 0.78
   (c) 0.28, 0.7, 1.5

10. (a) 0.6, 0.54, 0.47
(b) 0.3, 0.07, 0.03
(c) 2.7, 1.78, 0.96, 0.5
11. (a) 3.5 cm (b) 0.6
12. (a) 2.34 (b) 0.54 (c) 3.55 (d) 7.20
13 (a) 3 cm and 4 mm (b) 5m and 84 cm (c) 4 m and 50 cm
(d) 7 cm and 2 mm
14. 100 paise
15. 4 rupees 6 rupees 1, 25 4, 70
16. 500 paise 660 paise
17. (a) 3.35 (b) 7.50 (c) 7.05

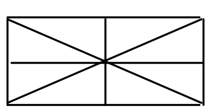
Exercise 5.2

1. (a) Cone (b) Cylinder (c) Sphere (d) Cube
(e) Cuboid or rectangular prism

Exercise 5.3

5. (a) Line (b) Line segment (c) Ray
8. (a) AB, BC, CA (b) AB, BC, CD, DA (c) AB, BC, CD, DE, EA
9. A line segment is a line, whereas a line extends on and on in both directions.
10. A ray is part of a line that starts at a fixed point and extends on and on in one direction, whereas a line extends on and on in both directions.
11. A line segment is a line between two fixed points, whereas a ray is a line that starts at a fixed point and extends on and on in one direction.
11. The figure show the eight lines with 3 trees in each line

. . .
. . .
. . .

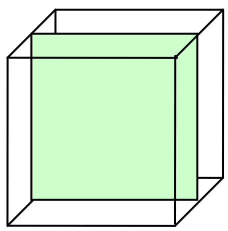


Exercise 5.4

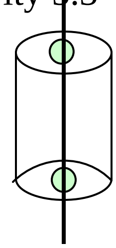
4. C 5. B
8. (a) acute (b)obtuse (c) right

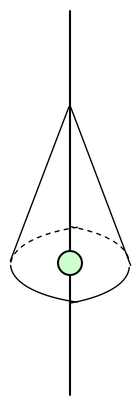
9. (a) acute (b) right (c) obtuse
10. right 11. straight
12. (a) right (b) . straight (c) 0
13. $\angle$ CAB, $\angle$ABD, $\angle$BDC, $\angle$DCA ; all of them are right angles.
14. $\angle$SPQ, $\angle$PQR, $\angle$QRS, $\angle$RSP; all of them are right angles.
15. $\angle$ CAB, $\angle$ABC, $\angle$BCA, all of them are ACUTE
17. (a) obtuse (b) acute (c) obtuse
(d) right (e) straight (f) acute

Activity 5.2



Activity 5.3





Exercise 5.5

1. All of them except fish
7. All of them except clock, leaf and arrow
8. (b) 6, 6 (c) infinite, infinite (d) 0, 5 (e) 5, 5
9. (b) 0, 2 (c) 2, 2 (d) 1, 0 (e) 0, 2 (f) 4,8
(g) 0, 4 (h) 0, 0

Exercise 6.1

3. (a) Rs.3.35 (b) Rs. 7.50 (c) Rs. 4.05
4. (a) Rs. 46 (b) Rs.19 (c) Rs. 105
5. (a) Rs. 2.50 (b) Rs. 20
6. (a) Rs. 80 (b) Rs. 8 (c) Rs. 4
7. (a) Rs. 80 (b) Rs. 5

Exercise 6.2

1. (a) Rs. 13.50 (b) Rs. 15 (c) Profit (d) Rs. 1.50
(e) Rs. 750
2. A loss of Rs. 150
3. By subtracting profit from S.P.
4. By adding profit to C.P.
6. By adding loss to S.P.
7.

Cost Price.	Selling Price.	Profit
Rs 5.50	Rs.6	**Rs. 0.50**
Rs. 15	**Rs. 16.20**	Rs.1.20
Rs. **2650**	Rs. 3000	Rs.350

8.

Cost Price.	Selling Price.	Loss
Rs 100	Rs.90	**Rs. 10**
Rs. 1500	**Rs. 1380**	Rs.120
Rs. 1850	Rs. 1500	Rs.350

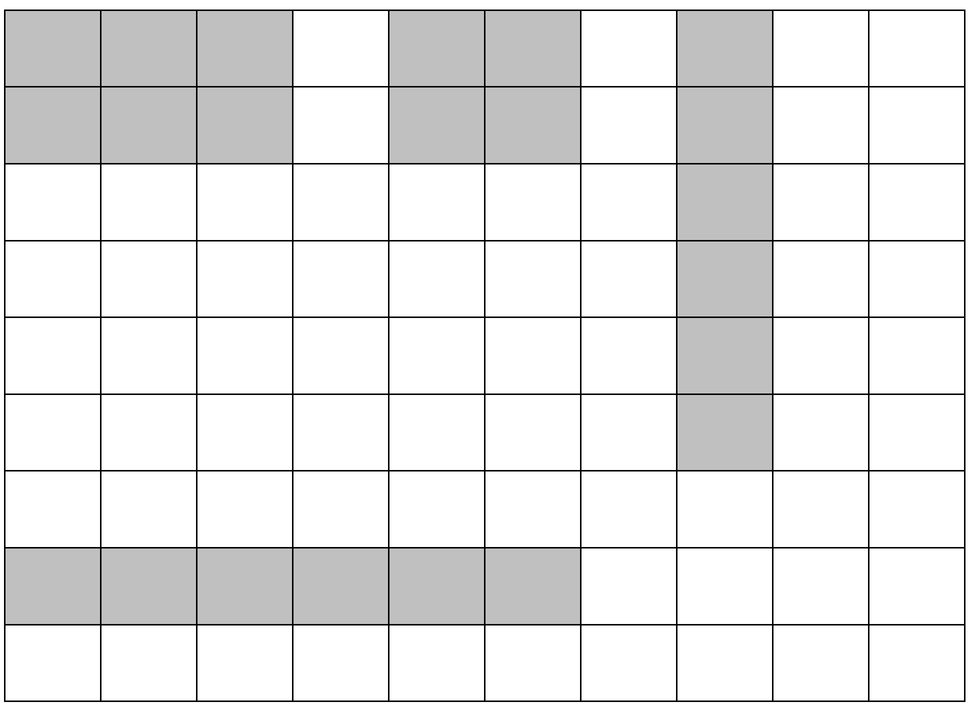
9. Rs. 14 10. Rs. 2,15,000

Exercise 7.1

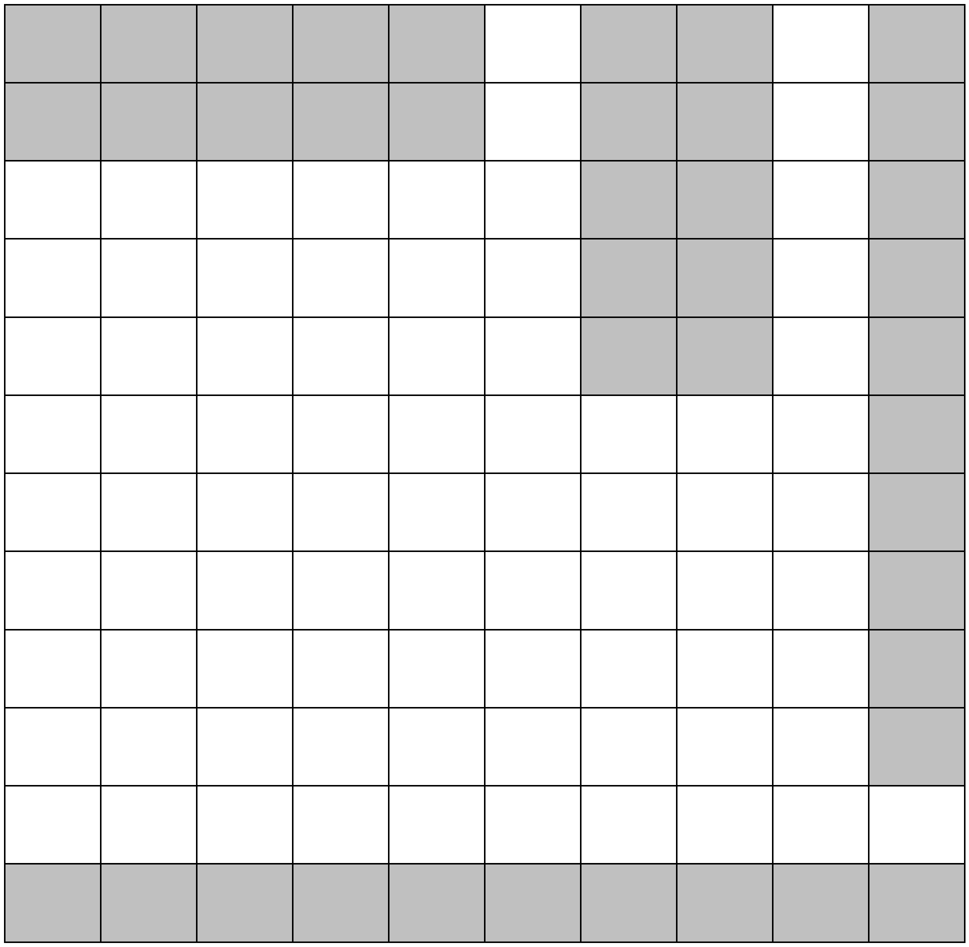
2. (a) 8 (b) 10 (c) 16 (d) 12
7. (a) 500 m (b) 2000 m
8. 5 m

Exercise 7.2

2. (a) 12 (b) 9 (c) 5 (d) 3 (e) 26
3.



(a)



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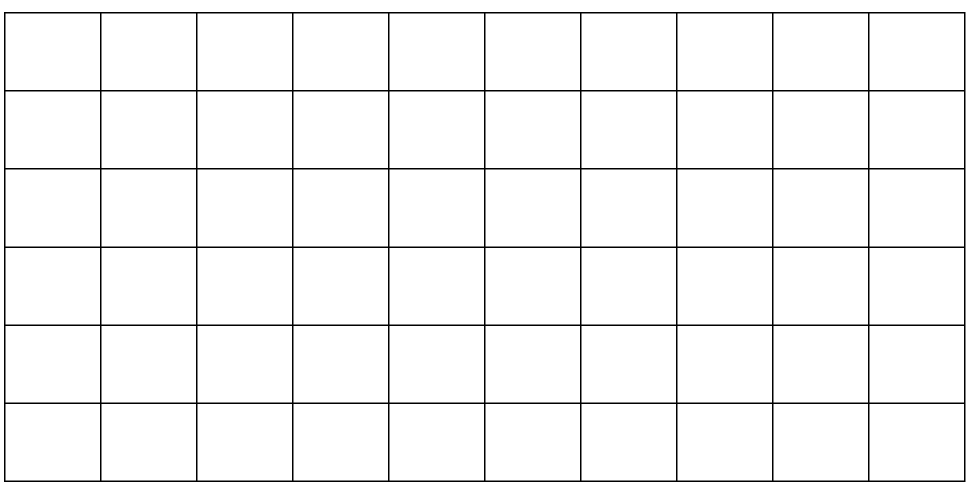
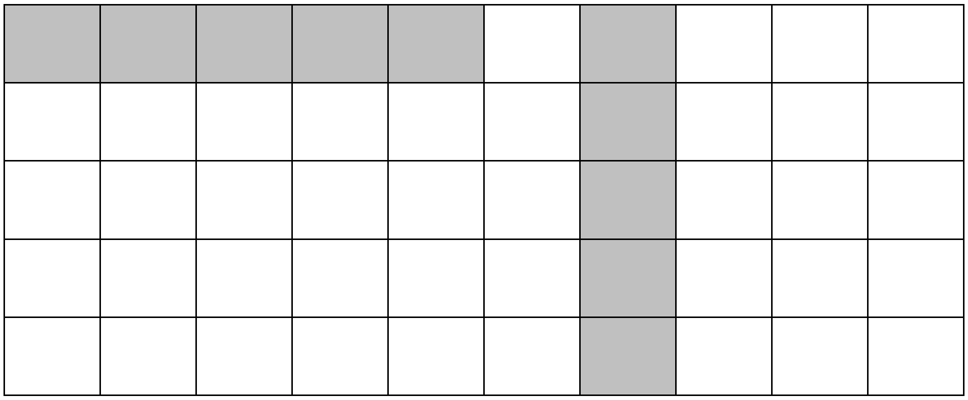
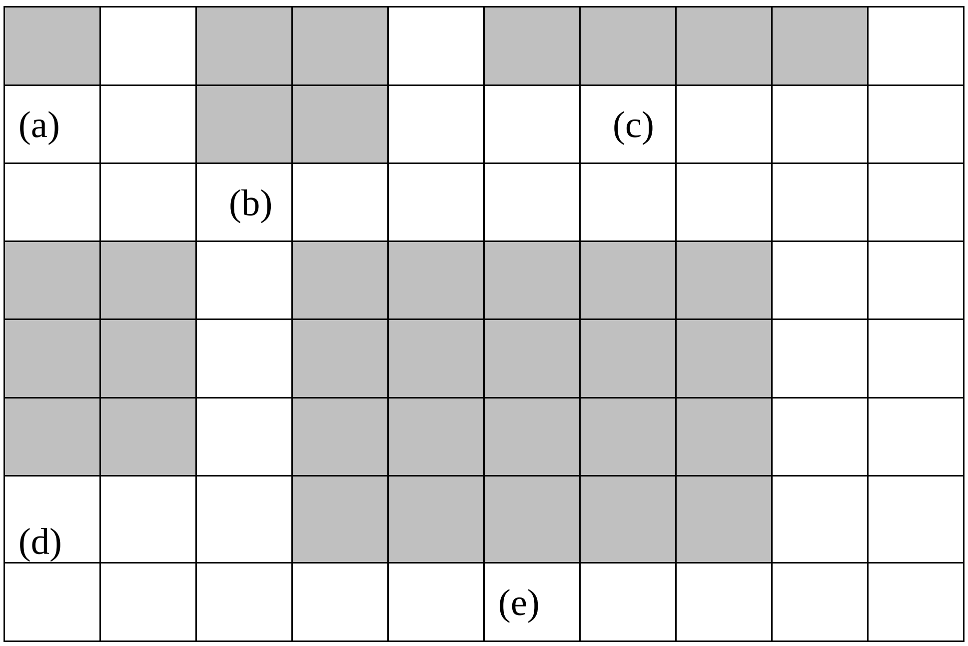




(c)

5.



6. (a) 12 square centimetres (b) 10 square centimetres
7. (a) 16 square centimetres (b) 9 square centimetres
8. (a) 31 (b) 32 (c) 9
10. (a) Yes (b) No
11. 3 × 4 rectangle

Exercise 7.3

3. (a) 12 (b) 27 (c) 30
5. Yes 6. 200 ml 7. 40

9.

Side of the cube	Area of a face	Volume
1 cm	1	1
2 cm	4	8
3 cm	9	27

10. 80 cubic centimetres

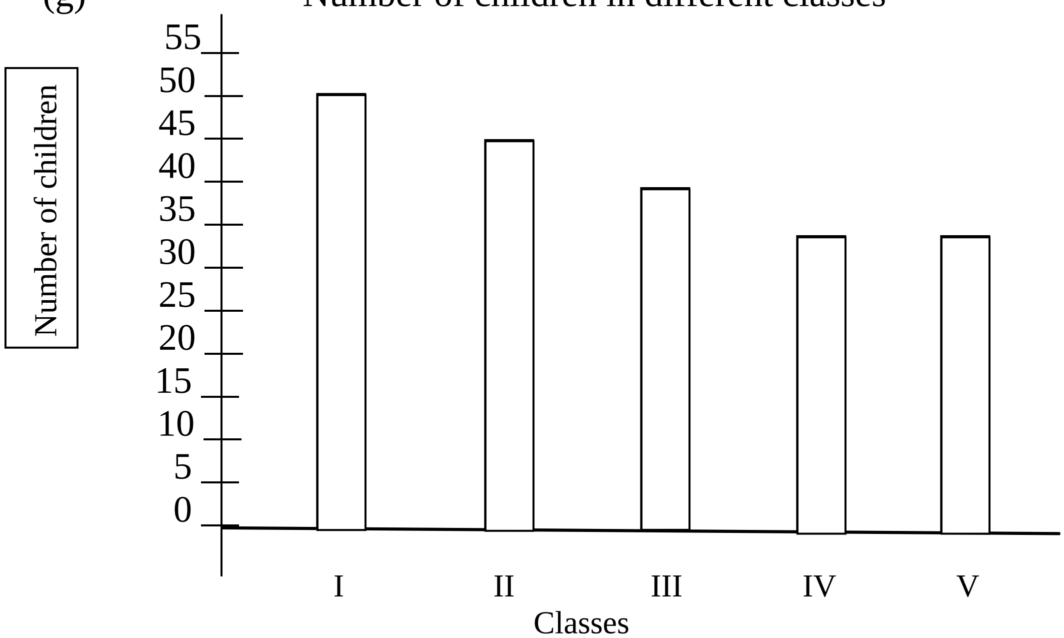
11. 9   12. 12   13. 5, 4 and 3; 60

14. (a)Fill the 8 litre container and then fill the 5 litre container, the water left in the big container is 3 litres
(b) Fill the 5 litre container and then pour it into the 8 litre container, Fill it again and pour water into the 8 litre container till it is full, the water left in the container is 2 litres.
(c) Fill the 5 litre container twice and pour it into a container.

Exercise 8.1

1. (a) 5   (b) 50   (c) 40   (d) I
(e) IV and V   (f) Number of children decreases

(g) Number of children in different classes



2. (a) 17   (b) 13   (c) 6

8. (a) 7   (b) 0   (c) 10   (d) 14   (e) 3
(f) 3

Exercise 9.1

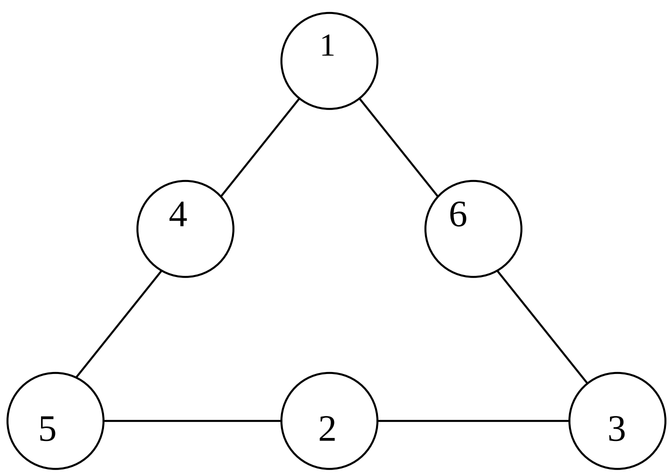
1.

7	**0**	5
2	4	6
3	**8**	1

2.

9	4	5
2	6	10
7	8	3

3. 1 + 2 +3 + 4 + 5 + 6 = 21
   1 + 2 +3 + 4 + 5 + 6 + 7 = 28
   Triangular
4. 1 + 3 + 5 + 7 + 9 = 25 = 5 × 5
   1 + 3 + 5 + 7 + 9 + 11 = 36 = 6 × 6
   Square
5. (a) 6 (b) 1 (c) 6 (d) 1 (e) 2 (f) 3
6.



8. (a) If one of the number increases by 1 and the other is decreased by 10, the product of two numbers decreases by 1.
   (b) (i) 575 (ii) 1368
   (c) (i) 19 × 21 = 20 × 20 – 1 = 399 (ii) 29 × 31 =30 × 30 – 1 = 899